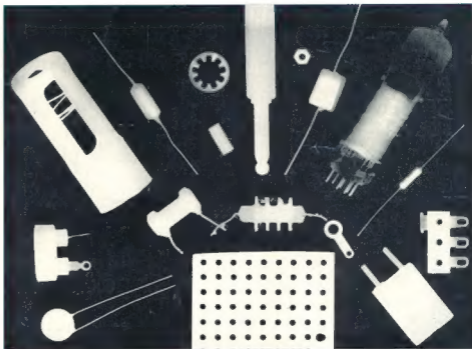


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APRIL 1963



Vol. 31, No. 4



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Phasing-Filter S.S.B. Generator*

Dual System for Better Sideband Suppression

DR. LEO H. McMAHON,† VK2AC

SINCE the introduction of Amateur s.s.b. in its present-day form, late in 1947, the two systems of sideband generation—filter and phasing—have been subjected to much experimentation and practical testing. As to a preference between the two methods, the trend toward the filter system, in one form or another, by manufacturers of Amateur equipment may be taken as a guide. This also follows a long-established practice in commercial communications systems. For the home constructor, however, both systems present problems. In the case of the filter system, the main ones are cost, positioning of the basic frequency in respect to the filter response, and sideband switching. With the phasing system, they are in the adjustment of the phasing controls (particularly in r.f. phasing), limitation of the suppression obtainable in practice, and wide frequency response unless special steps are taken to minimise it.

It was considered that if the two systems were combined, each in a simple form, the end result would be an improvement, even if each system was not adjusted to a highly accurate degree. The chance to put this into practice came with the availability of a "Sideband Package"² built in its originally described form, but in which the sideband generator was not considered satisfactory. This generator was simply replaced by a new one consisting of a low-frequency phasing-type generator, followed by a single half-lattice filter. The end results from this generator have been excellent as to both carrier and sideband suppression.

AUDIO PHASING CIRCUIT

The phasing system used (see Fig. 1) is essentially the one described by W2EVL,³ but scaled down to approximately 440 Kc. This frequency was chosen chiefly because suitable crystals were on hand. The exact frequency can be a matter of choice. The audio output at T301 in the original "Package" circuit was found to be sufficient with a little to spare.

There is one minor modification in the input resistor of the B. & W. audio phase-shift network used in the W2EVL circuit. The division of audio voltage input to the network must be in the ratio of 7:2. This ratio is determined by the position of the moving arm of the 500 ohm input potentiometer. However, it is possible to get this ratio in respect to either end of the potentiometer. This may cause confusion which can be avoided by using a fixed 500 ohm resistor as part of the network,

• By combining the features of the phasing and filter types of carrier and sideband suppression, VK2AC finds that more complete suppression is obtainable in practice with less critical adjustment of either section.

so that the higher voltage is always applied to Pins 1 and 5 of the p.n.a. as required. Increasing the total input resistance to 1,000 ohms has little effect in practice. If a potentiometer of less resistance is available, this can be used with a smaller fixed resistance to maintain the total of 500 ohms, if desired.

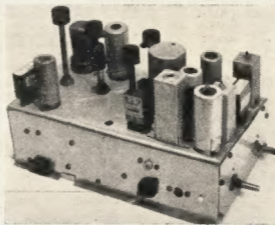
The coupling transformers used between the audio phase-shift stage and the balanced modulators are simply a pair of high to low impedance audio transformers. In the original W2EVL unit, it was suggested that 20,000 to 200 ohms be used. Anything of this general nature is satisfactory provided that the two transformers are similar.

made up of several higher-resistance values in parallel. The resultant capacitance and resistance are juggled until the r.f. voltages measured across the two arms are equal. Once this condition has been attained, no further adjustment of r. phasing should be required—a point that should appeal to all who have tried to adjust the two-coil system.

L3 should be a coil of i.f. type that will resonate at 440 Kc. with a capacitance of 100 pF. So far as the coupling coil L4 is concerned, it is necessary that it be only large enough to produce about 2 volts of r.f. peak to peak, across the output terminals. There is no point in making the coil larger than this.

BALANCED MODULATOR

The balanced modulator is a 440 Kc. version of W2EVL's, using semi-conductors instead of the vacuum diodes. To maintain the same LC ratio in the output circuit requires an increase in capacitance of about 20 times that used at 9 Mc., or a value of 0.02 μ F. for



VK2AC's sideband generator is constructed to fit in the space occupied by the original generator in the W2EVL exciter. To the left are Y1 and V1, the audio ratio and balance controls, the plug-in p.n.a., and the 12AT7. Near the centre are R1 and R2, the a.b. selector crystals (disregard the frequency marking on the foremost holder), and a round shield can containing L1, L2. In the adjacent line are L3, L4, the 12AU7, and the 6AG5. C2 (hidden) is mounted between the two tubes. At the right-hand end of the chassis are the 8BU4, T1, the filter crystals, and T1.

R.F. PHASING

The r.f. oscillator that generates the basic 440 Kc. signal (also shown in Fig. 1) is patterned after the low frequency circuit used in the "Package". The phasing arrangement is a very simple RC network suggested by Z1-1AAX.⁴ It is coupled to the output tank of the cathode follower. A value of 100 ohms was used for the resistance arm, and the capacitance required for a reactance of this same value is approximately 3,600 pF. Several capacitors of smaller values in parallel are used to make up a total of approximately the required value. Likewise, R3 is

each of the two capacitors, the resultant of the two in series making a capacitance of 0.01 μ F. across the coil. (As a convenient way of arriving at the size of coil needed to resonate at 440 Kc. a coil was wound that would resonate at 4,400 Kc. with 1/100 of the capacitance, or 100 pF.) A crude attempt was made to match the 0.02 μ F. capacitors by connecting them across an audio oscillator and measuring the voltage drop across individual capacitors until a pair with essentially the same drop was found.

Wire wound controls were used at R1 and R2 because they were found to be more reliable and positive in their action than carbon units.

* Reprinted from "QST," October, 1952.

† 22 Pitt St., Randwick, N.S.W.

² "Bigger," "A Sideband Package," "QST," June, 1951.

³ Vitale, "Cheap and Easy S.S.B.," "QST," March, 1950.

⁴ Earnshaw, "An Improved Phase Shift System," "CQ," November, 1952.

CRYSTAL FILTER

The output of the balanced modulator feeds a conventional Class A amplifier stage (see Fig. 2) which is followed by a single half-lattice filter. It is possible to overdrive the 6AG5, so the input coupling should be adjusted to avoid this.

The use of a single half-lattice filter in this combination gives all the results required. Surplus crystals were used and, since it is a difficult job for most Amateurs to alter the frequency, a different approach was used in selecting the basic frequency in respect to the filter curve. A study of the surplus crystal frequencies available, shown in

between the two filter-network crystals was sufficient. This represents the difference between Channels 320 and 319. Then, depending on the type of microphones in use and the general pitch of the operator's voice, the carrier frequency chosen was 463 or 1389 cycles below the lower-frequency filter crystal. The carrier crystal frequency in Fig. 1 is shown as 441.666 Kc.

This procedure is so simple, and gives such good results, that it is advisable to purchase a few odd crystals with which to experiment. The aid of other Amateurs should be enlisted and their opinions sought and studied to decide which carrier frequency is the most

tried in the experimental model but were not found necessary. C3 was made by twisting together two pieces of insulated wire.

SIDEBAND SELECTION

Sideband selection is accomplished by shifting the frequency of the oscillator feeding the balanced mixer. The system of selection used in the original "Package" was ingenious, but it may give rise to a possible source of trouble. In the frequency-multiplying stages any generation of a fifth harmonic might be applied to later stages and appear as carrier. It is not possible to balance out this fifth harmonic and so the practical carrier suppression may not be satisfactory. Some fifth harmonic energy is always generated in the multiplying stages and can feed into the output stage by devious routes.⁶ With the cheapness and availability of crystals ground to a desired frequency, the method shown in Fig. 2 is an easy way to avoid this possible difficulty. The two crystal frequencies should be spaced twice the carrier frequency. Crystals ground to specified frequencies may be obtained reasonably from several firms advertising in "A.R."

CONSTRUCTION

Physically, the unit was constructed to replace the original generator in the "Package". However, a 5" x 9 1/2" x 3" chassis was used to allow mounting of some of the components underneath. The first things mounted were the carrier-insertion potentiometer and the sideband switch to fit in exactly the places occupied by these controls in the original unit. From then on, parts were mounted with an attempt to keep r.f. sections as well spaced and isolated as possible to avoid unintentional coupling. The audio transformers were mounted underneath on opposite sides of the chassis. The diodes were mounted between the balancing potentiometers and the 0.02 μ F. capacitors, as well spaced as possible and at right angles.

The balanced modulator coil, L1, was mounted above the chassis and covered with a shield, while the Class A input coil, L6, was mounted underneath.

ADJUSTMENT

In the adjustment of any s.s.b. transmitter, the use of a v.t.v.m. with an r.f. probe is almost mandatory. The first step in the adjustment is to see that the two crystal oscillators are operating properly. In the low-frequency oscillator, the input to the arm of each balance potentiometer is about 2 volts peak to peak. This is not a very large value, but it is quite sufficient for the purpose.

The next step is to peak all of the tuned circuits. To do this, the crystals are removed from the filter, and one of them put in the oscillator. A spare FT-243 crystal, or a capacitor of about 10 pF., is inserted in one of the filter sockets to provide a small amount of capacitive coupling across the filter.

Set the phasing capacitor, C2 to minimum, and unbalance the modulator

⁶ This was not definitely confirmed by the author, nor has this difficulty been reported by anyone who has built the "Package". Adequate shielding of the multiplier stages is important, of course.—Editor "QST."

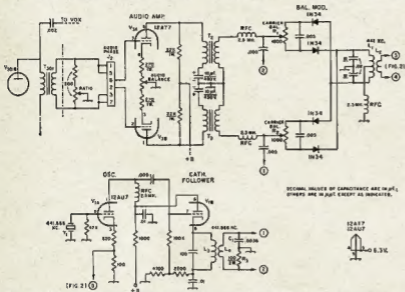


Fig. 1.—Audio and r.f. phasing circuits. Audio output from T301 in the "S.S.B. Package" now goes to the WIEWL phase-shift circuit (portion between broken lines in which original component designations are used) instead of to the balanced modulator. R.f. input to the WIEWL balanced modulator is now at 440 Kc. instead of 8 Mc. Semiconductors replace vacuum diodes in WIEWL's balanced modulator. The oscillator circuit is a modification of one used in the "Package". Resistances are in ohms, and fixed resistors are $\frac{1}{2}$ watt unless indicated otherwise. M indicates mica. Other fixed capacitors not listed below are disc ceramic. Values in the WIEWL portion of the circuit are the same as in the original.

C1—Mica capacitors in parallel (see text).
L1—40 turns No. 34 enameled, $\frac{1}{2}$ inch diam., close wound.
L2—13 turns wound over centre of L1.
L3—Approx. 1.5 mH. (see text).

L4—25 turns wound at ground end of L1.
R1, R2—Wire wound control.
R3—Nominal value (see text).
Y1—Channel 318 (surplus).

the following table,⁵ will reveal recurring frequency differences of 1389, 463, 926, 463 and 1389 cycles when two-digit and three-digit channel numbers are interposed.

Channel No.	Fundamental Freq. (Kc.)	Difference Cycles
317	440.277	
38	440.740	463
318	441.666	926
39	442.592	926
319	443.055	463
40	444.444	1389
320	444.444	0
41	446.298	1389
321	445.833	463
322	447.224	926
42	448.148	926
323	448.611	463

By experimenting it was found that a frequency separation of 1389 cycles

satisfactory from an audio point of view in each particular case. This may not seem to be a very scientific approach to the problem, but it represents by far the most satisfactory method from the practical angle.

A variable phasing capacitor (C2) is necessary for adjusting the filter to optimum. To provide a range of adjustment, a small fixed capacitance in the vicinity of 2 to 5 pF. is placed across the lower-frequency crystal, and a small variable capacitor of about 3 to 12 pF. or so across the other.

The transformers used in the filter are of the ordinary type, padded to approximately 440 Kc. and provided with a capacitive centre tap.

BALANCED MIXER

The balanced mixer stage (Fig. 2) uses a 6BU8, which has worked very well and gives a conversion gain of about five. Balancing controls were

⁵ Mason, "Surplus Crystals," "CQ," January, 1957.

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by running one of the balancing potentiometers to one end. With the output stage of the exciter feeding a dummy load, and with some sort of output indicator, such as a v.t.v.m., connected across the load (or a receiver tuned to some output frequency of the transmitter, as described in the s.s.b. chapter of the A.R.R.I. Handbook), all tuned circuits are peaked.

Next, adjust the injection from the crystal oscillator to give maximum gain in the conversion stage. With S1 set to the low frequency crystal, set C5 near maximum capacitance and adjust L7 for maximum injection. Then adjust C3 for optimum injection. Now turn S1 to the high frequency crystal and adjust C4 for the same injection. If the same injection cannot be obtained, it may be necessary to repeat the process with C5 set to a lower or higher value. Optimum injection is a matter of only a few volts. Since this oscillator feeds into a high impedance load, it is easy to overdrive the mixer. As a matter of fact, care must be used constantly to avoid overdriving at any point in the system. Overdriving is a most common fault in many s.s.b. transmitters. It is always better to underdrive than overdrive, so always set the levels a little on the conservative side.

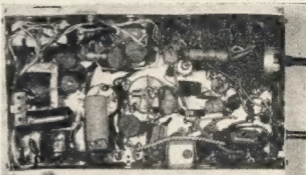
The next step is to see that the circuitry associated with the filter is functioning properly. To do this, remove the FT-243 crystal (or capacitor), and leave the two filter sockets empty. Now vary the phasing capacitor to see if the signal fed through to the output passes through a minimum. It is necessary to find this minimum so that in the final adjustment the capacitor can be set correctly for the most symmetrical response. The null point represents the point at which the circuit is neutralized. This point will be very close to the final correct position. Whatever signal that passes through after the null has been obtained is fed around the filter through stray paths. With the combination of phasing and filtering, a small amount of stray signal is of no importance.

The balanced modulator should now be checked for carrier feed-around. This subject is seldom given sufficient consideration. To make this check, replace the 10 pF. capacitor in one of the filter sockets and then disconnect the two r.f. leads from the balancing potentiometers of the modulator. Put the 441.666 Kc. crystal in the oscillator and then listen on a receiver to one of the transmitter output frequencies. Any signal heard is a result of leak-around and must be minimised.

although they were many inches apart. Shielding of both tubes is necessary. Time spent in getting rid of this leak-around will give you a much better signal.

Now the r.f. leads to the balancing controls can be replaced and the carrier balance controls adjusted for maximum suppression. The greater part of the carrier suppression takes place in the balanced modulator with a little additional help from the filter. (The main contribution of the filter is in elimin-

Bottom view of the filter/phasing sideband generator. The audio output transformers are mounted at right angles to the left. L5-L6 is mounted against the lower side of the chassis. The balanced modulator diodes are at the centre. Shunts extending to the right are RB (above) and RI (below).



Shielded wiring should be used in all power circuits. Remember that a capacitance that makes a good bypass at 9 Mc. may not be sufficient at 440 Kc. The voltage picked up at the cathode of the 441.666 Kc. oscillator should be the minimum required to give full carrier reinjection, since it was found that there was quite a large amount of leak-around directly from the oscillator to the 6BU8 stage. The voltage required at injection grids of the 6BU8 is only on the order of 300 millivolts, peak to peak.

It was found necessary to shield the balanced modulator output coil. After all other steps had been taken to minimise the leak-around, it was found that there was still slight leakage between the oscillator and mixer tubes,

ating the unwanted sideband.) Even without the filter, the residual carrier should be well down in the hum or noise. The stability of carrier suppression of this high degree is quite good, but not absolute.

The next step is to set the sideband suppression controls. This is done first for the phasing system, with crystals removed from the filter and the 10 pF. capacitor substituted as described earlier. By far the easiest and fastest way to set the ratio and audio balance controls is to feed in a single tone of about 1,000 cycles and adjust for minimum response on the unwanted sideband, using a receiver of sufficient selectivity; otherwise, you will have to make use of an oscilloscope pattern. When the audio phasing controls have been set, replace the filter crystals and set the filter phasing capacitor, C2, for maximum sideband suppression. It is in this step that you will need some sensitive detecting device, since the degree of sideband suppression will test the capabilities of any receiver. It gets to a point where it is hard to decide which to believe—the receiver or the generator.

An important point to watch in these adjustments for sideband suppression is to be sure that the same sideband is suppressed in both the phasing system and in the filter. If it becomes evident that opposite sidebands are being suppressed in the two sections, this can be corrected by reversing one set of audio output leads, or the r.f. input leads to the balanced modulator. The setting of the filter phasing capacitor for maximum suppression should come very close to the previous setting made for balance in the crystal filter. Once the suppression controls have been set, the tuned circuits can be repeated. In all of these adjustments, it is very essential to be sure that no stage is overloaded, since this may lead to false indications.

(Continued on Page 19)

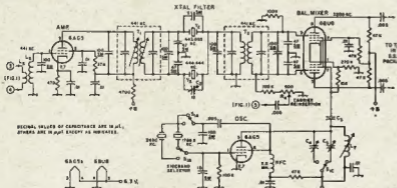


Fig. 2—Crystal sideband filter, balanced-mixer and sideband-selector circuit. This section fits between the balanced modulator of Fig. 1 and the 2.250 Kc. mixer of the "Sideband Package" circuit. The sideband selector replaces the original system in the "Package". Resistances are in ohms, and fixed resistors are $\frac{1}{2}$ watt unless indicated otherwise. SM indicates silver-mica capacitor. Other fixed capacitors not listed below are disc ceramic.

- C2—33-12 pF. trimmer.
- C3—Gimmick (see text).
- C4—85-240 pF. trimmer.
- C5—100-500 pF. trimmer.
- L5—3 turns over ground end of L6.
- L6—Same as L5 (Fig. 1).
- L7—20 pF. iron-ding coil.
- R4—Wire wound control.
- S1—Three-pole, two-position rotary switch.
- T1—T2—455 Kc. i.f. transformers.
- Y2—Channel 318 (surplus).
- Y3—Channel 320 (surplus).

Multiband Mobile Antenna Loading Coil*

E. ZIEMENDORF, W2IGI, and J. LAMPUS, W2KJV

To most mobile Hams the antenna system presents certain limitations and problems. Multiband operation multiplies the difficulties in nearly direct proportion to the number of bands used. Some of the problems have been overcome over the years by experimentation and "home-brewing," and it is the purpose of this article to describe the results of a recent effort to improve on multiband mobile antennae. Specifically, the article describes the details of construction of a tunable mobile loading coil for the bands from 75 to 10 metres.

The construction of the coil will present no problem to the Ham having access to a small machine shop. Because each Ham may have other sizes and dimensions of material available than those shown in the cutaway view, Fig. 1, drawings and dimensions of the individual pieces will not be shown.

The body of the loading coil is a paper-laminate phenolic tube (Spaulding Fiber) $1\frac{1}{2}$ " o.d. by $\frac{1}{2}$ " i.d. by 10"

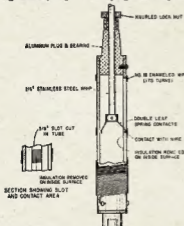


Fig. 1—Cutaway drawing showing the construction of the loading coil. The dimensions can be varied to suit materials available.

long. A longitudinal slot $\frac{1}{8}$ " wide by $\frac{1}{2}$ " long is cut in the tube. The ends of the slot are equidistant from the ends of the tube. Contact between the slider and the inside of the wire is made through this slot to provide tuning adjustment.

The slider contacts were made from heavy-duty spring contacts obtained from a defunct Centralab JV-9002 switch. Two of these are soldered 180 degrees apart to a collar which is then fastened to the main whip with set screws. One spring contact rides on the inside of the fibre tube and provides electrical and mechanical stability. The other contact rides on the inside surface of the wires, which have been cleaned of insulation.

Because of the danger of shorting turns, a chemical cleaner could not be

used to remove the insulation from the inside of the wire. Several slow and unsuccessful methods were tried before it was found that coarse sandpaper placed on a flat, narrow piece of material with a long handle could be used to abrade the inside surface of the wire. This method quickly removed the insulation along the length of the slot. It is essential that good contact be made between the wire and the sliding contact, to prevent noise and detuning.



External view of the coil, whip bearing and locking system.

Additional support for the whip, to help prevent the contact on the wire from moving, is provided by a fairly long bearing at the top of the coil. The aluminium plug and bearing is about $2\frac{1}{2}$ " long. The hole to pass the whip rod is a snug fit to help hold the contact secure. A Miller No. 10062 shaft lock holds the whip firmly in position after tuning to the desired frequency. The loading coil is secured to the base section by another aluminium plug tapped for $\frac{1}{8}$ -24 thread. Both of these end pieces are fastened to the inside of the fibre tube by three 8-32 machine screws

spaced 120 degrees apart. The ends of the wire are fastened under one of the screws at each end of the coil. The electrical circuit of the antenna is shown in Fig. 2.

CONSTRUCTION AND ASSEMBLY SUMMARY

The coil is wound with 175 turns of No. 18 enameled wire. The winding just covers the slot. The inductance with the slider all the way to the top (approximately 2.6 Mc.) is 120 microhenrys, with a Q of 150. About 80 μ H. is used at 4 Mc. Before the coil is wound, the form is sprayed with Krylon to reduce the effects of moisture. Several coats are later sprayed on the completed coil to help hold the wire in place and for atmospheric protection.

The inside of the coil wires must be well cleaned. This will prevent detuning during transmissions and eliminate "intermittents" during reception. A good snug fit in the bearing plug will aid in maintaining good contact between the slider and wire.

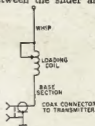


Fig. 2—Electrical circuit of the whip antenna with loading coil.

The whip is marked for the various bands and frequencies, which are then permanently stamped in the proper places. It was found that the 75 metre phone band could be covered with two settings, by tolerating a slight power loss at each side of a centre frequency. The other bands were calibrated at only one setting. This permitted optimum adjustment for any frequency within a given band. When operating on the 75 metre band the slider is set near the top, while on 10 metres the slider is at or near the bottom of the coil.

The antenna loading coil system shown in the photograph has been used for about six months under all conditions with good results. No detuning or noise has been experienced. Power as high as 60 watts into an Elmac AF-87 has been used without any difficulty.

This antenna tuning system has solved most of the problems encountered with tapped coils, outside sliding contacts, cumbersome LC tuners and others. It is small, neat, stable and, after calibration, easy to adjust to resonance on any band.

No measurements of any sort other than those mentioned above have been made on the coil. Successful QSOs are being made and it is felt that this provides a good indication of its operating characteristics.

* Reprinted from "QST," April, 1962.

High Altitude Nuclear Explosion at Johnson Island and Associated Effects on H.F. Signals at Hobart, Tasmania

LEN EDWARDS,* VK7LE

WITH the news some months ago that the U.S.A. intended to explode a number of nuclear devices at various altitudes above Johnson Island in the Pacific Ocean for the purpose of observing effects on radio communications, it was considered probable that some disturbance to long distance h.f. communications would be observed in Hobart on signals whose path passed close to the area.

After considering the problems involved it was decided to make an attempt to observe any such effects and in order to get maximum information from the observations, the following basic requirements would be necessary:

- (1) As many frequencies as possible should be observed.
- (2) The transmission path should pass through or close to the explosion area.
- (3) The observed stations should transmit for the full 24 hours each day.
- (4) A time standard should be available for accurate timing of any observed effects.
- (5) Received carrier strength and modulation should be observed.

The equipment available for the observations was three receivers, one twin-pen recorder, and two magnetic tape recorders, thus limiting the number of observed frequencies to two, and after a search for suitably located stations, it was found that the WWVH transmitters run by the American National Bureau of Standards and located at the Hawaiian Islands admirably fulfilled all requirements.

WWVH transmits continuously on frequencies of 2.5 Mc., 5.0 Mc., 10 Mc., 15 Mc. and 20 Mc. The modulation consists of standard frequency tones and one-second standard timing pulses which are controlled within very fine limits and therefore eminently suitable for timing any observed effects.

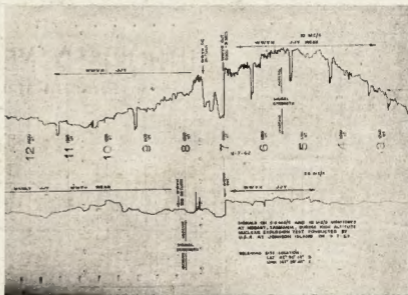
The signals at Hobart from these stations were checked on the various transmission frequencies and it was found that 10 Mc. and 5.0 Mc. were the only frequencies consistently received, the 10 Mc. signal being received with good strength between 2 p.m. and 5 a.m., a total of fifteen hours each day, and the 5.0 Mc. signal was received for approx. twelve hours each day from 4 p.m. to 4 a.m. These frequencies are shared on an international basis by frequency standard stations in other parts of the world, and at certain times other stations were received along with WWVH, however as all have carrier frequencies controlled to international standards no heterodynes are evident.

The stations received constantly were JYJ in Tokyo, WWV in Washington, BPV in Peicing and HBN in Switzerland.

land. Most of the time the signal from WWVH was predominant and readily identified on the chart by the carrier break of several minutes at 15 minutes past each hour.

This carrier break provided a ready time check on chart speed and also a check on the relative strength of other stations on the frequency during the off-air period. The audio output of each receiver, consisting of standard time signals, was fed to tape recorders which were switched on five minutes before the expected time of the explosion.

The rocket launching which finally resulted in the successful explosion was scheduled for 0900 hours U.T. on 9/7/62 (UT being essentially the same as GMT). Rocket lift off occurred at approx. 15 minutes before detonation of the device and the flight apparently continued normally until "zero" at 0900 hours. The start of the count-down zero time pulse coincided with the 0900 time pulse from WWVH, and although the count-down pulse appeared to be cut short and disappeared with a burst of static, the signal from WWVH



Pen recordings showing effects of high altitude nuclear explosion at Johnson Island on 10 Mc. and 5.0 Mc. signals received at Hobart from station WWVH in Hawaii. The sharp cut-off for both frequencies at the time of the explosion is clearly shown at 0900 U.T. (7 p.m. E.S.T.).

Continuous charts of the signal strength on 5.0 Mc. and 10 Mc. were made for approx. six weeks before a successful launching occurred at Johnson Island, and during this time a daily pattern of signal strength was established for comparison with signals received during and after the event.

The third receiver was used to monitor the count-down which was broadcast on several frequencies by American stations in the area. These status broadcasts, operating under the code name "April Weather", gave details of the count-down on a.s.b. on frequencies of 4631 Kc., 9253 Kc., 12020 Kc., 15515 Kc. and 17473 Kc. It was found that 12020 Kc. and 15515 Kc. gave best signals at Hobart. It was noted that the count-down time signals appeared to be synchronised with the time signals radiated by WWVH.

On 10 Mc. the signal continued until the 9th second pulse and then also cut out completely with a sharp click. Due to misoperation of the tape recorder the exact cut-off time of the 5.0 Mc. signal was not observed but the pen recorders on each frequency were observed to drop at the same time. Tape recorders showed that the signals from WWVH disappeared completely on both frequencies.

On 10 Mc. the signal returned weakly approx. 12 minutes later and then faded out again, gradual return to normal took place 32 minutes after the explosion, but faded again approx. 16 minutes later. It appears from the chart that WWVH signals were only present at 1115 UT and 1315 UT with little other evidence of signal for the rest of the night. The signal on 5.0 Mc. returned

(Continued on Page 19)

* 10 Musgrove Road, Lindisfarne, Tasmania

Further Modifications to the No. 122 Transceiver

I have read many reports of the lack of modulation, etc., in the ex-Service No. 122 Transceivers. The modifications I put forward are not mine, being group contributions.

When I first received my No. 122 set, I found the modulation to be both poor and noisy. After much searching through the modulator circuit, I found capacitor C4C to be at fault. This was replaced and the modulation and quality of same was considerably improved. I could now overmodulate the carrier. Another friend had similar trouble (low modulation and distortion) and by the replacement of this capacitor the set performance was much improved. C4C is in the plate circuit of V3A, a 1H6G, and is a by-pass to earth of 200 pF.

Another modification is to vary the size of the feedback capacitor C17A in the modulator circuit. The higher the value of this capacitor, the less modulator gain, and vice-versa. In my set, with the feedback circuit cut out, the gain was too high, resulting in reports of microphonic modulator valves.

To get loudspeaker operation, solder a 0.01 μ F. 600v. paper capacitor, or similar, from the second lug from the chassis end on the side nearest the front panel of the driver transformer T4A. The other lead is then taken to the line jack, the lead is soldered to this jack after cutting the other lead off the line jack. A high impedance

speaker transformer is connected with a suitable speaker to the line jack. The output is quite satisfactory, even for mobile work.

I found the sidetone a bit too high in level, so I "borrowed" relay R1A contacts 26 and 27 to switch in a 22K half-watt resistor on transmit. This cut the sidetone sufficiently so that no feedback was evident.

The next one is for those who are not thrilled with pulling the unit to pieces to change crystals. I obtained an ordinary two-pole four-position Oak switch and fitted it in place of the original oscillator control. I had to completely strip the switches and re-build them, as a switch of sufficient shaft length is not normally available. I fitted the extra crystal socket on the front panel just above and to the side of the switch shaft. A word of warning here! Make sure there is very little capacity coupling between the two wires or your crystals may not oscillate.

Fitting a co-axial aerial socket is a must and this can be fitted near the meter.

There are many modifications that can be done to these sets, many of which have been published in earlier editions of "Amateur Radio". (These include "Wireless Sets No. 22 and 122" July 1959; "Hint to 122 Transceiver Owners" April 1960; and "Modifications to No. 122 Set" January 1962.—Editor)

These sets are not the easiest to work on, but with care everything can be got at, and the resulting performance after modification makes it worthwhile.

—Rodney D. Champness, VK5ZCD.

Fools' Modulation

NOT everyone agrees with this explanation of f.m. as some people think it is a fine mode to use.

F.m. is now being used on 2 metres by Melbourne Amateurs and interest is certainly increasing.

Equipment being used is mainly of commercial origin, but don't despair, changed P.M.G. regulations will remove from commercial service a lot of gear ideal for Amateur use. However, v.f.o. and reactance tube works nicely and the evergreen 522 is a natural for f.m. net use.

The f.m. network frequency in Victoria is 145.854 Mc. Crystal multiplication to achieve approx. 10 kc. deviation is 38. Audio limiting and a.g.c. are also used to maintain high average modulation levels. Receivers should contain two limiter stages as adequate limiting will provide best results. Remember there are less components in a limiter stage than an i.f. amplifier and an f.m. detector is not really complex.

F.m. is easily copied using slope detection with a conventional a.m. receiver, but don't condemn f.m. Under these conditions f.m. is only 25% as effective as an a.m. transmitter of the same power.

A good f.m. receiver should limit with a 1 microvolt signal giving a Readability 5 signal. With f.m., all signals are Readability 5 (unless there's little deviation) and signal strengths are weak or strong. Gone are the days of lament when you get S7 in return for your statement of S9+ incoming.

Vertical polarisation is recommended which follows commercial practice of a quarter wave vertical whip antenna.

Mobile operation is most popular as interference (ignition, etc.) does not appear. This is most welcome. Most mobiles run 20 watts input to the 2E26 final and to the writer's present knowledge about 40 of these units are in Amateurs' possession. About 20 larger units (p.p. 2E26s) are known to be in Amateur hands and in the process of conversion, some running inputs as high as 120w.

This f.m. net (145.854 Mc.) will, I feel, expand rapidly and provide an excellent basis for W.I.C.E.N. or emergency use.

Is a.m. better than f.m., or is h.f. better than v.h.f.? No matter what your answer is, all modes and all bands should be used.

Care should be taken to ensure that all 2 metre f.m. stations operate on the correct frequency.

If any information or assistance be required, please contact the writer, A. J. Stewart, VK3ZFS, 11 Woodstock Rd., Mt. Waverley, Vic. or J. Spicer, VK-3ZEL, 413 Stephenson Rd., Mt. Waverley, Vic.

Conversion of the 522 for f.m. use is planned and details will be published as soon as possible.

—VK3ZFS.

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AN EFFECTIVE NOISE SILENCER*

USING A SEPARATE NOISE RECEIVER

G. T. SASSOON, G3JZK

● This interesting article describes the practical application of noise quenching to an Amateur-band receiver, and is based on the sophisticated Collins design for QEN suppression, known as the Noise Blanker. An essential factor in the success of the unit described here is the R.C.A. 7360, a valve of an unusual type with special characteristics. Our contributor has been obtaining very satisfactory results with this noise suppressor for some two years, and has used it successfully on v.h.f. as well as on the h.f. bands. It is an important development in contemporary Amateur-band receiver design. — Editor, "The Short Wave Magazine."

receiver; this has necessitated the use of two pentodes for the flip-flop, where otherwise a double triode might have sufficed. Also, the first half-cycle of a noise pulse could be either positive-going or negative-going at the detector input; for this reason, it is necessary to use a full-wave detector.

The primary objection to this silencer as regards fitting it to existing receivers, is that it is necessary to break into the i.f. chain. There is no real solution to this problem and, even if there were, it would be most difficult to prevent the stray coupling which would enable the noise pulses to bypass the gated stage. Ideally, the unit should be built in conjunction with an outboard i.f. strip. The balanced gate may also be used as a frequency-changer, simply by feeding in a local oscillator signal in parallel with the silencing pulses, and taking output at the desired frequency. It is hoped in due course to use the existing unit in this way to change from 450 kc. to an 85 kc. i.f. This can be done by feeding in a crystal-controlled signal at 535 kc. and installing an 85 kc. transformer on the output side.

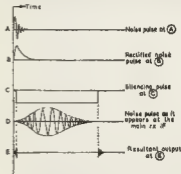


Fig. 1—Waveforms of a noise pulse as it appears at various points in the block diagram, Fig. 1.

In operation, the unit is most effective on s.b. signals, and when listening on those (rare) spots on the h.f. bands where there are no signals. On c.w. the holes are occasionally noticeable, particularly when they occur in the middle of a dash; however, only at the highest speeds could this cause a dash to sound like two dots. On strong a.m. signals, however, the holes are distinctly audible, particularly when it is necessary to increase the hole length to cope with the noisier vehicles. Nevertheless, the amplitude of pulses present in the output cannot exceed that of 100% modulation of the incoming carrier, so that the performance of the unit at its worst is equivalent to that of an ordinary diode clipper at its best. On weaker a.m. signals, the holes are much less noticeable, and under no conditions do they make copying difficult.

CIRCUITRY

The noise receiver front-end (Fig. 3a) uses two 6AK5s, with conventional circuitry. Only two stages are necessary to give the required gain; owing to the broad-band nature of noise, the

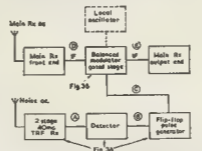


Fig. 3—Block diagram of silencer and associated receiver. The circuit arrangement is explained and discussed in the text. The local oscillator is included if the gated stage is also serving as a frequency-changer.

Secondly, if the bandwidth in the noise receiver is made high enough, then the silencing pulse itself will contain components at the i.f. Therefore, if a single-ended gated stage were used, the silencing pulses would appear in the output, defeating the entire purpose of the unit. If a low-pass filter (cutting off signals at the i.f.) were placed (say) at point C in Fig. 1, the bandwidth would be too small and the silencing pulses would arrive too late. For this reason, a balanced gate is essential; it must be set up so that no component of the silencing impulse can appear in the output. In practice, the balanced gate proved to be the most difficult part of the design and, in fact, a satisfactory solution was not achieved until the R.C.A. 7360 became available.

IN the design of many of today's communications receivers, a much neglected feature is the noise limiter. This is possibly due to the fact that commercial users can pick their QTH, and therefore are not likely to be troubled by ignition noise to the same extent as Amateurs—a fact of which the designers of many specialised Amateur-band receivers do not seem to be aware. Furthermore, the increase in road traffic makes the ignition noise problem still more acute, particularly, of course, to the mobile worker. The deficiencies of the conventional diode clipper-limiter type noise suppression circuit are well known. At best, they are barely effective on weak phone signals, and almost totally ineffective on s.b. Various solutions have been proposed: the Lamb noise silencer (first described in "QST" for Feb. 1936) is a lot more effective, although still suffering from certain inherent disadvantages; and, more recently, the Collins Radio Co. have marketed a silencer similar in principle to that described here. However, neither circuit seems to have achieved much popularity on this side of the Atlantic, so the present article may be of some assistance to fellow-sufferers from ignition QRM.

PRINCIPLE OF OPERATION

Consider the block diagram of Fig. 1. A noise pulse radiated by a car's ignition system is picked up by the noise and main aerials simultaneously. It is amplified and detected by the noise receiver, which operates at about 40 Mc., and the rectified impulse is then used to trigger a monostable flip-flop circuit. This produces a long, negative-going pulse, which is applied to the balanced gate in the main receiver i.f. chain, so as to switch the receiver off for a period. In the meantime, the noise pulse has also been coming through the main receiver front-end. However, the bandwidth of the latter is comparatively narrow—a few kilocycles, as compared with over a megacycle for the noise receiving section. Therefore the noise impulse will take some time to build up to full amplitude at point D—much longer than it takes at point C. This is illustrated in Fig. 2. Thus, it is evident that the silencing impulse will have cut off the gated stage some time before the pulse arrives via the main receiver at point D, and so the net noise output from the gated stage at E will be very little. What we have done, in effect, is to switch the receiver off for the duration of the noise pulse.

This system works very well, but there are a number of critical points about the design which must be taken into consideration. First, every precaution must be taken to maintain the highest possible bandwidth in the noise

*"The Short Wave Magazine," August, 1962.

noise output is proportional to bandwidth as well as to gain. This receiver has a bandwidth of about 2 megacycles (about 200 times that of a normal receiver), so only about 1/200 of the gain is required. The noise aerial can be any odd length of wire, although a vertical dipole placed strategically low down and near the road gives best results. (A 40 Mc. dipole is about 10 feet long, to save you working it out!) It is advisable to break the aerial connection to the unit when transmitting, to avoid damaging the r.f. stages with excessive grid current.

The anode of V2 is inductively coupled to the full-wave detector D1, D2: gain is deliberately sacrificed here by using a step-down at L3, to improve bandwidth. A negative-going pulse is delivered to the grid of V3, which is normally conducting. As a result, the anode of V3 delivers a positive impulse to V4 grid, V4 being normally cut off. If this impulse is sufficiently large to make V4 conduct, a negative impulse appears at its screen, which is fed back via the detector circuit and C16 to V3 grid; V4 conducting, and V3 being cut off.

After a time, determined by VR1 and its associated 100K resistor R8 and 300 pF. condenser C16, the circuit reverts to normal. V3 produces a negative-going pulse at the anode of V4, the length of which is controlled by VR1. At the same time, a positive pulse appears at V3 anode, which is used to light a neon lamp, NE1. (This helps to fill up the panel, and gives an indication of when the unit is working.)

The negative impulse from V4 anode is fed to the control grid of the 7360 (Fig. 3b), which also has a diode (D3) fitted to protect it from positive-going surges, as recommended by the makers. The i.f. input is fed to the detector electrolytes of the 7360, balanced circuitry being used, since it gives a slight improvement in performance. (If, for any reason, this was inconvenient, it could probably be dispensed with.)

Cross-neutralisation is employed between deflector electrodes and anodes, using Philips' trimmers, VC1 and VC2, mounted on stiff wires over the valveholder. This is not strictly necessary to prevent instability, but is included to counter signal feed-through when the valve is cut off. Similarly, it is necessary to take every possible precaution to keep input and output isolated from each other. The input and output i.f. transformer, IF1 and IF2 (Fig. 3b), should be placed some distance from the valve, and the anode and deflector connections made with twisted pairs of wires. Using this ex-

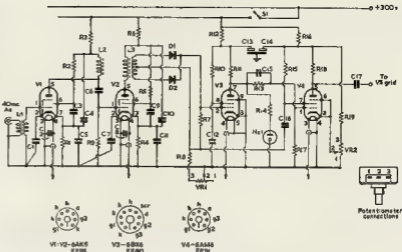


Fig. 3a.—Circuit diagram of 40 Mc. noise receiver and pulse shaper, the output of which drives the gating unit—see Fig. 3b. In the arrangement shown here V1, V2 constitute the broad-band v.h.f. receiver, in which D1, D2 form a full-wave detector. As explained in the text, the action of the circuit is to produce a negative-going pulse at the anode of V4, the length of which is controlled by VR1. The neon NE1 is merely an indicator, and will absorb the positive pulses. The general inter-connection into the main receiver is shown in the block diagram of the system, at Fig. 1.

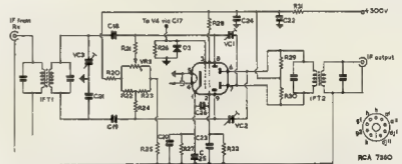


Fig. 3b.—The balanced gate unit, incorporating the 7360, which is driven by V4 in Fig. 3a. VC1, VC2 are neutralising trimmers, and the adjustment and setting-up procedure are discussed in detail in the text. When the silencer is working properly, there should be an absolute blanking of peaky-noise signals, such as car ignition. G3ZK has used the circuit for the last two years with great success, in a very noisy main-road location.

Table of Values for Figs. 3a and 3b.

C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11 — 0.005 pF. disc ceramic.	R13 — 500,000 ohms.
C12 — 1 pF. paper.	R14 — 100,000 ohms; value depends on the type.
C13, C14 — 32/32 pF. 450v. electrolytic.	R15 — 10,000 ohms, 1w.
C15 — 100 pF. ceramic.	R16 — 330,000 ohms.
C16 — 300 pF. mica.	R17 — 100,000 ohms, 1w.
C17, C20 — 0.1 pF. mica.	R18 — 4,700 ohms, 1/2w.
C18, C19 — 0.001 pF. ceramic.	R19 — 15,000 ohms, 1/2w.
C21 — 15 pF., silver mica.	R20 — 1 megohm.
C22 — 32 pF., 450v. electrolytic.	R21 — 180 ohms, 10%.
C23, C24, C25 — 0.005 pF. disc ceramic.	R22 — 15,000 ohms.
VC1, VC2 — 3-5 pF. Philips' trimmers.	VR1 — 5 megohm log.
R1, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38, R39, R40, R41, R42, R43, R44, R45, R46, R47, R48, R49, R50, R51, R52, R53, R54, R55, R56, R57, R58, R59, R60, R61, R62, R63, R64, R65, R66, R67, R68, R69, R70, R71, R72, R73, R74, R75, R76, R77, R78, R79, R80, R81, R82, R83, R84, R85, R86, R87, R88, R89, R90, R91, R92, R93, R94, R95, R96, R97, R98, R99, R100, R101, R102, R103, R104, R105, R106, R107, R108, R109, R110, R111, R112, R113, R114, R115, R116, R117, R118, R119, R120, R121, R122, R123, R124, R125, R126, R127, R128, R129, R130, R131, R132, R133, R134, R135, R136, R137, R138, R139, R140, R141, R142, R143, R144, R145, R146, R147, R148, R149, R150, R151, R152, R153, R154, R155, R156, R157, R158, R159, R160, R161, R162, R163, R164, R165, R166, R167, R168, R169, R170, R171, R172, R173, R174, R175, R176, R177, R178, R179, R180, R181, R182, R183, R184, R185, R186, 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R2159, R2160, R2161, R2162, R2163, R2164	

pendent, it was found possible to do without full screening.

The i.f. transformer connections shown on the input and output sides are only suitable if the unit is to be connected by short lengths of coax. Otherwise, matching arrangements must be made, preferably including a cathode follower on the output side.

Chassis layout should be logical, with plenty of space left between stages. This is frequently as effective as sub-chassis screening for preventing instability. All power connections should be made with screened wire, and all r.f. stage heaters decoupled at the pins. Apart from the messy agglomeration of components round the 7360 base, the unit should present few problems constructionally.

ALIGNMENT

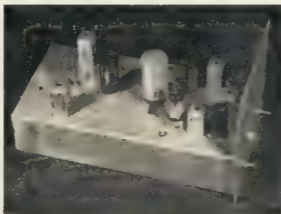
After assembling and checking all wires, insert the 7360, connect up the i.f. leads, and switch on. If all is well, signals should be audible. Tune in a strong station and peak up the i.f. transformers with VC3 (Fig. 3b) at the middle of its travel. Then connect

oscillate provided that the layout is sensible, all decoupling condensers are present, and the coils are in cans or otherwise isolated.

When the noise receiver is functioning correctly, plug in V3 and V4. The neon, fully lit hitherto, should go out. If VR2 is advanced (clockwise), the neon will light brightly to the accompaniment of a high-pitched squealing from the loudspeaker. Bring VR2 back to a point well below that where the oscillation ceases. The unit should now work after a fashion, but it is still necessary to adjust the balancing controls at the 7360. For this purpose, a test signal is necessary. This is most conveniently provided by an unsuppressed vehicle parked as close as possible to the noise pick-up aerial and ticking over. (However, caution should be exercised in using this method if the vehicle is on the road, since it is an offence to leave it unattended with the engine running. So unless the XYL can be persuaded to go and sit in it, something else must be found; possibly an electric buzzer or bell left running would suffice.)

acteristics and suggested applications. They are somewhat expensive, 55/- (Sterling) each about two years ago, but worth it in that they permit considerable circuit simplifications. They consist in principle of an electron gun, a pair of deflecting electrodes much like those in a c.r.t., and a pair of anodes. The gun projects a sheet beam of electrons between the deflectors, on to the anodes. When the deflectors are at the same potential, each anode receives an approximately equal share of the current. Any difference in deflector potential causes the relative anode currents to change, whereas if both deflectors are changed in potential by the same amount, the anode currents are virtually unaffected. At the same time, the total anode current can be modulated by the control grid. This valve lends itself to numerous applications. For example, it could be used as an audio phase splitter, with earthed control grid, audio input to one deflector, and outputs from the anodes.

However, its principal application is for balanced modulator use in s.b. equipment; for this purpose it is of considerable value, since it makes it possible to build a balanced modulator with two single-ended inputs.



The noise silencer unit as designed and constructed by G3ZKX and fully described in the article. Once adjusted, and incorporated into the main receiver, its operation is automatic. It will give almost complete noise suppression and within certain limits the higher the stray noise level, the more effective the action of the limiter. It is based on an advanced and very sophisticated design used commercially by the Coltham Radio Company.

a 22 $\frac{1}{2}$ -volt deaf-aid battery between 7360 grid (negative terminal) and earth (positive terminal). This should cause an appreciable falling off in signal strength. Adjust VC1 and VC2 (the neutralising trimmers) for minimum signal. Disconnect the battery. The stage should now function again, amplifying strongly; it should give at least 70 db. reduction in signal when the battery is connected.

Next, the noise receiver should be aligned. Plug in the 6AK5s, and connect headphones across the 27K resistor R7 at V3 grid. Noise should be heard, increasing when the aerial is connected. Peak-up the cores of L1, L2 and L3. The exact frequency chosen for this is not critical; the most important consideration is that there should be no non-noise signals in the passband. (At Cambridge, a frequency just i.f. of t.v. Channel 1 Sound is quite satisfactory.) With good h.r. phones, ignition noise should be uncomfortably loud when the stages are correctly aligned. If no output is obtained, check for oscillation by connecting a voltmeter in place of the phones. However, the unit should not

Thus provided with a steady noise signal by one of these methods, the neon should flash regularly, and there should be a clicking from the receiver. To adjust the balance, back off the r.f. gain on the main receiver, and turn up the i.f. unit gain as much as possible. There will probably be a considerable amount of noise. Adjust VC3 and VR3 for minimum output; try touching up the neutralising trimmers if the null is not very sharp. Then return to normal listening conditions, peak up the i.f.s., and repeat the battery test to make sure. The unit should then be fully functional, producing virtually no noise when there is no input signal, and blocking any signals completely when cut off by the battery.

When finally it is working, the only indication you should ever receive of passing traffic will be a frantically flashing neon.

ABOUT THE 7360

As a postscript, a few words about this valve might be in order, although the makers' agents—R.C.A. (Great Britain) Ltd., of Sunbury-on-Thames—will provide full information on char-

ERRATUM

The author of "A 100 Watt P.E.P. Band-Switched Phasing S.S.B. Transmitter" (October 1962) has drawn attention to an error in the circuit on page 4. The 50 pF. coupling condenser in the output pi-coupler should be 500 pF.

W.I.A. D.X.C.C.

Listed below are the highest twelve members in each section. New members and those whose totals have been amended will also be shown.

PHONE

Call No.	Cer. No.	Cnt. ries	Call No.	Cer. No.	Cnt. ries
VK6RU	3	281	VK3AWL	14	211
VK6RZ	4	278	VK3ARN	13	204
VK6RMK	43	270	VK4HR	12	192
VK3AHO	81	263	VK3RW	23	184
VK4FJ	21	264	VK3GB	30	183
VK6RW	4	211	VK3MZ	61	150

C.W.

Call No.	Cer. No.	Cnt. ries	Call No.	Cer. No.	Cnt. ries
VK3KE	10	307	VK3RP	50	249
VK3CX	26	291	VK3PK	15	230
VK3QL	5	279	VK3RZ	6	222
VK4FJ	20	274	VK3AGH	71	220
VK3NC	19	266	VK3JA	8	218
VK3RU	18	240	VK3RX	23	216

Amendments:	New Members:
VK3KB 75 205	VK3JZ 77 100
VK3AK 65 203	
VK3KD 53 192	

OPEN

Call No.	Cer. No.	Cnt. ries	Call No.	Cer. No.	Cnt. ries
VK3AK	5	200	VK3AHO	16	209
VK3RU	8	200	VK3AGH	35	205
VK4FJ	22	283	VK4HR	7	233
VK3KB	74	273	VK3BZ	4	231
VK3NC	77	269	VK3JA	4	229
VK3RG	3	267	VK3WL	45	225

Amendment:
VK3TL 85 150

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HETERODYNE FREQUENCY METER WITH CRYSTAL CALIBRATOR*

Design, Construction and Performance

E. PAWSON, VQ5IB/G8AP

MOST Amateurs at times feel the need of a reliable frequency meter and it is, in any case, obligatory to have a means of ensuring that the transmitter frequency stays within the Amateur bands. Although many modern receivers incorporate a crystal calibrator, there are considerable advantages in having a compact separate instrument, which includes both a crystal standard and a stable, calibrated wide-range heterodyne oscillator. Good quality frequency meters can be purchased—the BC221 is well known—but, even secondhand, they are not cheap. In any case, it is the writer's view that building such a piece of apparatus (and getting it working satisfactorily) is not only very interesting, but also very instructive.

Having purchased a Brookes 100 kc. standard bar, in vacuum mounting on a BTG base, and having obtained a 1,000 kc. crystal from a No. 48 Set, the author decided to build both these

into a crystal oscillator, and to put a v.f.o. (as a heterodyne oscillator) into the same box. While there is nothing new in this idea, nor in the circuits used, the detailed arrangement, and the results obtained, may be of interest to other Amateurs.

FREQUENCY RANGE OF THE OSCILLATOR

Range switching was not considered acceptable, so attention was concentrated on a Clapp oscillator, of which the harmonics would be used on the higher frequency bands. This leaves one with the choice of covering most of the bands with rather poor bandspread, or providing mainly for the 7, 14 and 21 Mc. bands. The latter alternative was chosen, as good bandspread was considered essential; in addition, those three bands were of most interest at this station.

The heart of the instrument was to be the Eddystone 888 dial, the full traverse of which gives 800 scale divisions. It was finally decided to make

• This is a practical approach to a subject of interest to many an Amateur Radio operator—the provision of an independent, accurately calibrated and reliable frequency measuring unit. All such instruments—on our h.f. bands, at least—work on the principle of a variable frequency oscillator used as an external heterodyne wavemeter. The problem is to build and calibrate such an oscillator to the required degree of accuracy and stability. This article explains how it can be done on the Amateur work bench.

the calibrated range 3500–3800 kc. and to set the instrument so that this coincided with scale readings of 50 to 450 on the dial. Although the HO would, for convenience, be running on 3.5 Mc., its main function would be on the 2nd, 4th, 6th (and, to a lesser extent, 8th) harmonics. The following ranges would thus be spread over 400 scale divisions:

7,000 —	7,200 kc.
14,000 —	14,400 kc.
21,000 —	21,600 kc.
28,000 —	28,800 kc.

If it is desired to cover the 1.8, 3.5 and 28 Mc. bands adequately, the only real answer seems to be to capacity switch.

CIRCUIT

One EF91 (6AM6), V2 in Fig. 1, is used in a conventional Clapp circuit, and a second EF91, V1, as a Colpitts crystal oscillator. A switch (S1) has been incorporated, so that either the 100 kc. or 1,000 kc. crystal may be switched in, together with their respective bridge condensers. In addition, a diode D has been put into the output circuit to improve harmonic content.

It will be noted that the capacity in the v.f.o. (h.o.) tuned circuit has altogether five components. C8 is the main tuning condenser of 13.5 pF. maximum capacity, while C9 in series with it reduces its capacity swing, and permits exact control of the degree of bandspread. C10 provides most of the padding capacity, and C11 allows a small fraction (about 3 pF) of the latter to be controlled from the panel, for zero-setting the oscillator. Finally, C12 is the negative-temperature coefficient (n.t.c.) component, which materially improves the frequency stability. The inductance L1 is not adjustable.



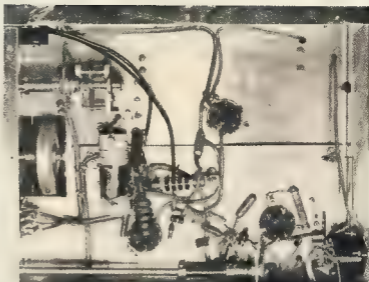
The Heterodyne Frequency Meter as described in the article. It is capable of giving a high order of frequency measurement on the h.f. bands, provided the crystal calibrator can be accurately checked against WTVH. The crystal selector and function switches are on the left of the tuning control. The dial and tuning mechanism are of the latest Eddystone design, giving a wide sweep on the scale. Two crystal oscillator frequencies, of 100 and 1,000 Kc., are used and can be brought out separately; the zero-setting knob for bringing the instrument on to calibration is on the right.

At VQ8IB, a 320/6.3 volt power supply is on tap from an outlet on a small receiver, so one 90 volt and one 150 volt regulator tube, V3 and V4 in series, were built into the unit. The crystal oscillator and v.f.o. thus draw regulated supplies at 240 and 150 volts respectively. The total h.t. drain is about 16-18 mA. The function switch S2 controls h.t. as follows: position 1, off; position 2, crystal on; position 3, v.f.o. on; position 4, both on.

CONSTRUCTION

The unit was built into a box 9½" wide x 8½" high, and 11½" from front-to-back, constructed from 16 gauge aluminium—see photograph. The width chosen was about the minimum which would take the Eddystone dial. Doubtless each constructor will build the box in his own way, but it was found convenient here to bend one piece to form the front panel and two sides. The chassis (with only a narrow flange), back, top and bottom covers were then made from four separate pieces, fixed where necessary by means of angle strips. This made a good solid job, and the generous dimensions assist heat dissipation and enhance stability. To improve this further, a series of 3/16" ventilating holes were drilled: 208 in the top cover, and 33 in each side above the chassis. A pleasing burnished appearance was achieved by giving the pieces a hard scouring with a power-driven wire brush before assembly.

Components and wiring are straightforward. The main dial is of best quality, and the tuning condenser C8 (13.5 pF.) is also a good quality Eddystone. The other expensive component



Under-chassis view of the Frequency Meter, showing general layout. The switch S2 (see circuit) is beside the dial-circuit flywheel, and the zero-setting condenser is above the coil. The power connections are carried in screened leads.

is, of course, the 100 kc. standard bar, but a first-grade crystal is essential. Apart from these, most of the items were home made or secondhand, in many cases obtained from surplus equipment. Except for C12, Philips concentric air trimmers were used for all padding and trimming functions, as a large number were at hand from stripped 88 Sets.

The crystal oscillator trimmers C2 and C4 (two Philips condensers each) are soldered through small silvered strips, which are then mounted on a perspex bridge over a slot in the chassis. C2 and C4 are thus isolated from each other and from chassis.

The zero-setting capacitor C11 needs to be only 2 or 3 pF. maximum capacity, so a little surgery was performed on an old 50 pF. variable. All except one pair of plates were filed off; these were bent a little farther apart, and the capacity was finally brought to a suitable value by soldering on, in series, a sub-miniature 4.7 pF. tubular ceramic.

The coil is wound with 26 gauge enamelled wire on a 1" diameter ceramic former, such as those found in 21 Sets. Some of these have wide-spaced spiral grooving: the tendency of the wire to slip into the groove was overcome by first covering the former with thin (.001") polythene. Some experimenting was needed in the number of turns, but the size finally arrived at was 45 turns close wound, plus 3 turns spaced out over 1". The purpose of the 3 wide-spaced turns was to bring the wire to the end of the former, as this is made with the fixing holes at the extreme ends. After completing adjustments, the turns were anchored with polystyrene cement. The finished coil was mounted under the chassis on two short pillars, consisting of 4 BA bolts with nuts and locking washers.

The power supplies at 320 and 6.3 volts were brought into the back, through a recessed (safety) six-way socket, obtained complete with plug from a 38 Set. (These ex-Army units are extremely useful as a source of bits and pieces!) The output from the two oscillators is brought through low value fixed condensers to suitable connectors on the front panel, such as coaxial sockets or jacks.

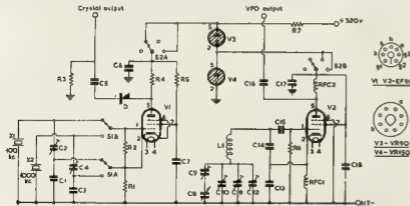


Fig. 1.—Circuit of the instrument described in the article. The circuitry associated with V2 forms the stabilised variable frequency oscillator, the coverage of which can be calibrated to a high degree of accuracy—see text. V1 is a c.c.o. with switched 100/1,000 Kc. crystals for marking and checking the variable oscillator, it can also be used as a separate 100/1,000 Kc. marker, giving band-edge and calibration heads into the receiver.

- C1, C13, C14 — 0.001 μ F., silver mica.
- C2, C4 — 200 pF. Philips concentric trimmers in parallel.
- C3 — 6.8 pF. tubular ceramic.
- C5 — 0.01 μ F. bypass type.
- C6 — 13.5 pF. variable (Eddystone 380).
- C7 — 3/30 pF. Philips concentric trimmer.
- C8 — 2 or 3 pF. variable (see text).
- C9 — 7/45 pF. trimmer, negative coefficient (N500).
- C10 — 100 pF. silver mica.
- C11 — 15 pF. silver mica.
- C12 — 10,000 ohms, ½ watt.
- R1, R3 — 0.5 megohm, ½ watt.

- R4 — 22,000 ohms, ½ watt.
- R5 — 100,000 ohms, ½ watt.
- R6 — 68,000 ohms, ½ watt.
- R7 — 5,000 ohms, 5 watts.
- S1 — Two-pole, two-way wafer type.
- S2 — Two-pole, four-way wafer type.
- RFC1 — 1.5 mH. r.f. choke.
- RFC2 — 2.5 mH. r.f. choke.
- L1 — 45 turns 35 gauge enam. close wound, plus 3 turns winding length ½ inch. Wound on 1 inch diam. ceramic former (see text).
- X1 — 100 Kc. standard crystal.
- X2 — 1,000 Kc. crystal.
- D — General purpose diode, OAM1.
- V1, V2 — EF81 (4AMS).
- V3 — VR390.
- V4 — VR150.

SETTING UP

When using the crystal oscillator, e.g. when zero-setting the h.o. or calibrating, it has been found convenient to connect the crystal output socket to the receiver aerial socket. On the other hand, when using the oscillator as a frequency meter, it is often unnecessary to make any connection to its socket. It beats satisfactorily with incoming signals, or with the exciter unit of the transmitter.

After warming up the instrument for about half-an-hour, the station receiver was tuned to the 15 Mc. transmission of WWVH. With the crystal oscillator running at 100 Kc., trimmer C2 was adjusted to pull the frequency into zero-beat with WWVH during one of the unmodulated periods of transmission. The 1,000 Kc. crystal was then switched in and a similar procedure followed, using the trimmer C4. The two trimmers were then fixed with sealing compound.

The heterodyne oscillator was next adjusted for frequency and bandspread. With the help of the crystal oscillator, the receiver was first tuned to 7,000 Kc. The n.t.c. condenser C12 was set

zero-beat on 7,200 Kc. at a dial reading of 450. C9 was then fixed with sealing compound.

TEMPERATURE COMPENSATION AND FINAL TRIMMING

The setting of the n.t.c. condenser C12 has to be done before the main trimmer C10 is finally set and sealed, because it forms part of the total padding capacity. The procedure adopted with the original model was as follows:

The n.t.c. trimmer having already been left at about quarter-capacity, the main dial was set at exactly 50, the functional switch at "both" and the power supply switched on. As soon as oscillation started (about 15 seconds), the zero-setter was used to bring the h.o. to zero-beat on 7,000 Kc., the time recorded and the instrument left running. At intervals, the main dial was altered to restore zero-beat, and the time and exact dial reading (estimated to 0.1 division) recorded. Suitable times were every five minutes during the first half hour, every 10 minutes in the second half hour, and thereafter every 15 minutes up to a total time of about 2½ hours.

When the drift test is satisfactory, the ceramic trimmer is left, the main dial set at 50, and the zero-setting control put at 60% of full scale. The main trimmer C10 is adjusted to give a zero-beat on 7,000 Kc. and may then be fixed with sealing compound.

CALIBRATION

The v.f.o. is conveniently calibrated by running the receiver on the 28 Mc. band, and picking up each 100 Kc. harmonic of the crystal from 28,000 to 28,800 Kc. The heterodyne oscillator is first zero-beat on 28,000 Kc. with the tuning dial at exactly 50; at each of the subsequent 100 Kc. points, the zero-beat dial reading is accurately recorded. In addition, by tuning the receiver to the 21 Mc. band, four further calibration points may be picked up, corresponding to fundamental frequencies of 3516.6, 3533.3, 3586.6 and 3593.3 Kc. From the 13 points so obtained, a graph of frequency against dial reading is constructed. In order to do this, it is strongly recommended that a "flexible curve" be obtained to assist in the drawing. If this is used, and adequate care and patience exercised,

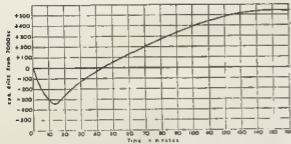


Fig. 2.—The drift characteristic curve of the crystal-checked heterodyne frequency meter, in conditions as described in the text. As explained in the article, the shape of this curve can be varied according to the adjustment of the negative coefficient condenser. When a long warm-up run is possible, it is sufficient to check the scale against the crystal standard as readings are taken.

to about one-quarter capacity and left there during this series of adjustments. The series condenser C9 was set nearly at maximum, the main tuning dial at exactly 50, and the zero-setting control C11 at about 60% of full scale. The h.o. was then switched on and the padding condenser C10 adjusted to bring the frequency to that of the receiver. Then, with the h.o. and crystal oscillator both on, the zero-setting control was used to zero-beat the oscillator with the 7,000 Kc. crystal harmonic. (Note that it is necessary to bring the h.o. close to 7,000 Kc. before putting the crystal oscillator on, as otherwise zero-beats can be obtained with the oscillator tuned to the wrong 100 Kc. harmonic, even though the receiver is on 7,000 Kc.)

The main tuning dial was then set at exactly 450, and the receiver used to determine whether the oscillator frequency was above or below the 7,200 Kc. crystal harmonic. In accordance with the result, the series condenser C9 was slightly reduced or increased respectively. This whole process was repeated until the heterodyne oscillator was accurately zero-beat on 7,000 Kc. at a dial reading of 50, and accurately

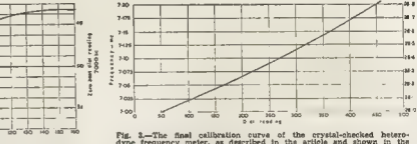


Fig. 3.—The final calibration curve of the crystal-checked heterodyne frequency meter, as described in the article and shown in the photographs. From this basic curve, obtained from a specimen instrument constructed on the principles given in the text, graphs can be produced covering the higher frequency bands. Accuracy is limited only by the extent to which the crystal checker can itself be adjusted to zero-beat with some external frequency standard, such as WWVH.

The character of the drift can best be seen from a graph of the results, and one such example is reproduced here (Fig. 2). If the zero-beat reading goes appreciably above 51, or if it continues to rise after about the first 25 minutes, more n.t.c. capacity is probably required. On the other hand, if the zero-beat reading does not rise initially in the manner shown, or if the subsequent fall brings the reading much below 49, there is probably too much correction. The n.t.c. trimmer would then be adjusted in the appropriate direction and a new test carried out.

Readers not wishing to perform these experiments may obtain a simpler check. The instrument is switched on as before, the dial set at exactly 50, and the h.o. zero-beat on 7,000 Kc. It is then simply left running for two hours. At the end of this time, the dial is reset for zero-beat, and the reading noted. If this is above 50, the instrument requires more n.t.c. capacity; if it is less than 49½, the n.t.c. capacity needs reducing. After making the necessary adjustments to C12, a new check is carried out. The instrument should, of course, be allowed to cool right down between tests.

a perfectly smooth and highly accurate curve can be drawn—see Fig. 3. For this purpose, the flexible curve is far better than sets of "French curves".

DISCUSSION OF RESULTS

The 100 Kc. crystal was easily set to zero-beat with WWVH, and required about the expected amount of trimmer capacity (50 pF.). The 1,000 Kc. crystal obtained from the 48 Set, however, proved to be slightly inaccurate. After adjusting the trimmer as low as possible, it was still running 1.3 Kc. low on the 15,000 Kc. harmonic. The rotors were therefore removed altogether from the trimmers and this slight error accepted since, in any case, its main function is to provide 1,000 Kc. identification points.

Some initial trouble was experienced in getting the heterodyne oscillator to go off satisfactorily, and the cause was eventually traced to wrong constants in the tuned circuit. The dimensions of the coil had been worked out "according to the book," but L/C ratio actually present proved to be too high. After the coil had been pruned to the size given here, all was well.

(Continued on Page 18)

A CLOSE-UP ON A WV

PICTURE TUBE MANUFACTURE



There is also a need to resolve the internal conflict between the two main groups of the opposition, the *democrats* and the *reformers*. The *democrats* are the group that has been most vocal in its criticism of the government and its policies. They are the group that has been most active in the formation of the opposition parties. The *reformers* are the group that has been most vocal in its support of the government and its policies. They are the group that has been most active in the formation of the government parties.



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AMALGAMATED WIRELESS



S VALVE CO. PTY. LTD.

Adjustment of the bandspread to exactly 400 scale divisions was quite straightforward and, when the setting was correct, the series capacity was estimated to be about 27 or 28 pF.

Calibration was also very satisfactory. The final calibration graph is reproduced here and does not suffer from cramping at any part of the scale; in fact, it is quite a pleasing approach to a linear relationship. For convenience in use, it is useful to enter on to the station calibration chart the 7, 14, 21 and 28 Mc. frequency scales. One minor, though interesting, feature is the slight reversal to a sigmoid shape which occurs near the top of the curve. At first, this was thought to be experimental error, but calibrations under other conditions gave the same indication. It was finally confirmed by an extra frequency observation at a dial reading of 500 (shown in the dotted portion of the graph). Calculations by the author have confirmed that this is not an effect caused by the presence of series and parallel capacitors, in association with the tuning condenser. The latter is nominally a straight-line-capacity type, but it is suggested that, as it nears its minimum, the approach of the unmeshed end of the moving vanes to the stator will slightly diminish the rate of decrease of capacity. This effect would be confined to settings near the minimum and would cause the peculiarity referred to. Over the calibrated range, there is no detri-

mental effect on the linearity of the curve.

The aspect which the author found most interesting was the effect of temperature on stability, and altogether 14 drift experiments were run. It is not necessary to give details of all these, but the main findings are summarized below.

The accompanying graph, Fig. 2, shows the drift characteristic in the final arrangement. The zero-beat dial reading, also the drift from the original 7,000 Kc. (dial maintained at 50), are shown plotted against time. During the first 40 minutes or so, the drift peaked to about -300 cycles and returned to zero. After that, it continued in a positive direction, reaching +500 cycles at about 130 minutes, when it flattened off and the frequency remained more or less constant.

When no n.t.c. capacity was used, the drift went continually more negative, and after only 30 minutes had reached -2.5 Kc. On the other hand, when larger amounts of n.t.c. capacity than that corresponding to the graph were introduced, the initial "valley" diminished or disappeared. The subsequent rise was then greater, reaching values of more than +1.5 Kc. The conditions illustrated by the graph therefore represent the best compromise, if one wishes to be able to use the meter soon after switching on. The graph shows that, for this degree of correction, if the meter is zero-beat

as soon as it starts to oscillate, and is also reset once to zero-beat after running about 80 minutes, it can be used the whole time after switching on, and will never be more than about 250 cycles in error (on 7,000 Kc.). That maximum error could be further reduced, of course, if one elected to carry out any extra zero-setting adjustments.

The above is the author's preferred approach but, if one wished, slightly less n.t.c. correction could be used, so that the eventual rise in frequency would be less. The initial "valley" would then be greater, and the instrument would only be usable after that stage had been passed. In the author's final arrangement, the n.t.c. trimmer had been adjusted to an estimated value of about 13 pF. (using type N500 trimmer).

To conclude the work, observations of temperature were made at two places inside the box: one close to the crystals, and one near the tuning condenser and ceramic trimmer. The temperature before use (and the room temperature) was 24°C. (75°F.). In five hours continuous running, the temperature only rose to 33°C. near the crystals, and 32°C. near the tuning condenser. No problems other than ordinary drift correction are posed by this nine-degree rise, and the 100 Kc. crystal would not change by more than 100 cycles at 7,000 Kc. ($\frac{1}{2}$ cycles at the fundamental).

BIG THINGS in TRANSFORMERS

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SIDEBAND TOPICS—BUD POUNSETT,* VK2AQJ

MODIFICATION TO HIGH FREQUENCY FILTER

February "A.R." contained quite an amount of information on crystal filters and filter crystals. Arle Bles has sent along some further contributions to help you along the way to s.s.b.

Arle refers to the high frequency crystal filter appearing in "Amateur Radio," Feb. 1963, page 9, Fig. 2. It has been found that the shape factor of the hybrid crystal filter can be improved considerably by the simple addition of a small trimmer across the input crystal F2 (see diagram, Fig. 1). The effect is a steepening of the high frequency side of the passband curve. Too much capacity will make that slope near vertical, but a new lobe higher in frequency will appear outside the normal passband. The proper setting therefore for this trimmer is only a few pF., say 5 to 10 pF. maximum, just enough to get the proper symmetrical passband without introducing a new filter lobe.

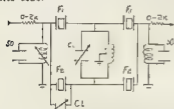


Fig. 1—Crystal Filter.

To tune the filter, tune for maximum output on $\frac{1}{2}$ ($F_1 + F_3$), set C1 at minimum required capacitance for symmetry in the band pass. Adjust C2 for flat top of the band pass.

USING THE 5 Mc. FILTER

The transmitter block diagram (Fig. 2) and frequency table should be self-explanatory. A simple but very effective

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tive transmitter can be planned with a high frequency crystal filter. The use of overtone crystal oscillator frequencies higher than the operating bands will prevent a lot of trouble with spurious responses, birdies, unwanted mixing products, etc. With the frequencies as indicated, all three bands will tune the same way and only one v.f.o. range is required.

Those interested who have difficulties in procuring the required overtone



Fig. 2—Block Schematic of S.s.b. Transmitter.

Overtone Osc. Freq.	S.s.b. Signal	Intermed. S.s.b. Freq.	V.f.o. Range	Output Range
13850	+5500 U.S.B.	19350 U.S.B.	5350-5000	14000-14350 U.S.B.
17850	-5500 U.S.B.	12350 L.S.B.	5350-5200	7000-7150 L.S.B.
14350	-5500 U.S.B.	8850 L.S.B.	5350-5150	3500-3700 L.S.B.

Automatic sideband selection on each band, output frequencies tune the same way as v.f.o.

High Altitude Nuclear Explosion at Johnson Is.

(Continued from Page 7)

weakly approx. 70 minutes after the event and remained very weak throughout the rest of the night.

It is therefore apparent that high altitude nuclear explosions do have an effect on long-distance h.f. circuits. This particular explosion occurred at an altitude of "hundreds of kilometres," probably in the ionosphere upper layers, and assuming the explosion took place on the count-down "zero," i.e. exactly at 0900, the signals from WWVH remained unaffected until nine seconds later. The fact that the signal path between Hawaii and Hobart passes several hundred miles south east of Johnson Island may help to account for this.

In the meantime, the next explosion is awaited with much interest so that further observations can be made. ■

Phasing-Filter S.b. Generator

(Continued from Page 5)

In many phasing-type transmitters, even when the carrier-suppression controls are set to the optimum points, there is still a lot of residual signal.

crystals can write me direct, as for the crystals required for the filter and carrier oscillator.

MECHANICAL FILTERS

Here is some interesting news in this field. We all know of the Collins product and that at least two Japanese firms are producing mechanical filters. One Japanese manufacturer even makes a filter especially for Amateur use at a very reasonable price, especially if you can buy it in Japan.

During a recent conversation with a UA1 in Leningrad, I was told, to my surprise, that the mechanical filter in the UA1's transmitter was a product of the U.S.S.R. No more details were forthcoming but a little more may be learned at a later date.

Next month, I hope to bring you some interesting applications of Collins filters in transistorised equipment.

This is caused by the generation of low-frequency sidebands by the ripple frequencies of the high-voltage supply. Even when the last audio tube is removed, where parallel feed is used there still remains a circuit through which these low frequencies can circulate and so introduce sidebands at the ripple frequency in the output. Since the phasing system cannot suppress these low-frequency sidebands, it is essential to use maximum filtering in the power supply. A good double-section filter has been found necessary.

It is felt that the combination of phasing and filtering gives such good results with a minimum of pitfalls that it is well worth consideration by any home constructor. It is capable of results equal to those of any commercial unit, and the exciter will test the selectivity of any receiver. Best of all, the results are easy to duplicate as attested to by the fact that several successful conversions have been made.

Acknowledgments are due to KH6BCX who suggested the dual system so long ago that he will probably have forgotten about it, to VK2AJZ who constructed the "Package" on which all of the original experimental work was done; to VK2AST who complicated the subject by introducing mathematics; and to all others who can see any evidence of their work in this unit. ■

P.A.C.C. CONTEST, 1963

V.E.R.O.N. (Vereniging Voor Experimenteel Radio Onderzoek in Nederland) invite Amateurs all over the world to take part in the seventh P.A.C.C. Contest. The main purpose of their annual contest is to help Amateurs obtain the well known P.A.C.C. Award, for which QSLs or other written confirmation are needed of 100 different PA/PI stations.

Applicants for the P.A.C.C. Award will NOT have to submit PA/PI QSLs for QSOs made in the P.A.C.C. Contest, provided that their P.A.C.C. contest logs are in the possession of V.E.R.O.N.'s contest manager. If your PA/PI QSLs plus your P.A.C.C. Contest QSOs complete the 100 different worked PA/PI stations, you may send in your application, with QSLs, contest log details and three I.R.C.'s to the V.E.R.O.N. Traffic Bureau, P.O. Box 100, Amsterdam. The contest logs of the applicants will then be cross checked against the contest log of the PA/PI participants.

There now are also stickers available for 200 and 350 different PA/PI stations worked. (P.A.C.C.-200 and P.A.C.C.-300)

RULES

1. Contest Periods. C.w: April 27, 1963, from 1200 G.M.T. till April 28, 1963, 1800 G.M.T. Phone: May 4, 1963, from 1200 G.M.T. till May 5, 1963, 1800 G.M.T.

2. Frequencies: All bands between 1.8 and 30 Mc. may be used. Cross band contacts are not valid. (Attention: PA stations on topband 27m only licensed to operate between 1535 and 1535.5 kc.)

3. Procedure: Stations outside of the Netherlands will call "CQ PA" while PA/PI stations will call "CQ P.A.C.C.". Stations will exchange a six (five on phone) digit control number consisting of RST (RS) and the serial number of the QSO starting with 00. PA/PI stations give after this control number two letters, indicating their province. The provinces are as follows:

GR, Groningen; GD, Gelderland; ZH, Zuid-Holland; FR, Friesland; UT, Utrecht; LZ, Zeeland; DR, Drenthe; NH, Noord-Holland; NB, Noord-Brabant; OV, Overijssel; LB, Limburg.

4. Points: Each QSO, confirmed by "R" or "QIK", counts 3 points, 4 points are earned upon receiving the control number correctly and 1 point upon receiving the "R" on the transmitted control number. Unconfirmed QSOs may be completed by working the same station a second time. Each station may be worked once per band.

5. Multiplier: For stations outside of the Netherlands, the provinces give one point per band for the multiplier, thus the maximum obtainable multiplier is 16.

6. Final Score: The final score is the sum of all QSO points from all bands, multiplied by the sum of all worked provinces/countries on all bands.

7. Entries: Multiband operation for stations outside of the Netherlands only.

8. Certificates will be awarded to the highest scoring stations in each country/district for c.w. and phone.

9. Contest Reports: The logs have to be filled-in as follows: (1) Date and time (G.M.T.), (2) Stations worked, (3) Province worked, (4) Multiplier column for each band (8M in multiplier only if it is a new province), (5) Transmitted control number, (6) Received control number, (7) points.

Logs must be postmarked no later than 15th June, 1963, and have to be sent in Mr. P. v. d. Berg, PA/PI, Contest Manager V.E.R.O.N., Keizerstraat 54, Gouda, The Netherlands.

Each log has to be accompanied by a signed statement that the participant has observed the contest rules as well as the regulations for Amateur Radio in his/her country. In cases of dispute, the decision of the V.E.R.O.N. Contest Committee is final.



Correspondence

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the publishers.

AWARDS FOR S.W.I.'s

Editor "AEL", Dear Sir,

During 1961 I wrote to the VK Awards Manager seeking information re v.h.t. awards for S.W.I.'s, and in reply, I quote, "I have to advise there is no certificate issued for S.W.I. reception by the Federal Executive."

At the same time I wrote to ZL land with the same request, and as I had the ingredients for a v.h.t. Award in that country, though they may have one for S.W.I.'s. The reply was in the negative, but more hopeful than VK. I quote, "The matter of Awards for S.W.I.'s, is receiving my attention and I hope to make an announcement by the end of the year."

Early in 1963 I again contacted the ZL Awards Manager and was told that the matter would be cleaned up by June or July of that year, and then it would be a pleasure to attend to my certificate requirements. I have just received a letter saying that my application for the 30 Mc. Award will be accepted.

I feel sure that something in the way of an award similar to the "Eustathian" or an S.W.I. equivalent of the W.A.V.K. could be arranged so as to create an interest for listeners.

New Zealand has made it possible, so why not give a thought for S.W.I. Awards in Australia?

—Chas. Abernathy, WIA-L211L

DID IT WORK?

Mr. L. D. Rickaby, VK4VR, recently soldered together 85 empty beer cans in an attempt to produce a novel form of aerial. The cans were kept straight by placing them in a long wooden trough whilst solder, about a pound of it, was poured in the tops and bottoms.

The finished job was then mounted on insulators and is now adorning Mr. Rickaby's garden at Cooper's Plains, Brisbane.

The Beer Can Aerial is light enough to be held in one hand yet strong enough to stay up without guy wires. The aerial is equivalent to a piece of wire 33 ft. long.

Colin Grells (A3034), who told us about this aerial, has not yet been able to discover whether it has produced the DX results on 7 and 14 Mc. expected of it.

—Reprinted from the R.S.G.B. "Bulletin," December, 1962.

Going to Auckland in June?

The New Zealand Association of Radio Transmitters is holding its National Conference in Auckland this year during week-end, 1st to 3rd June.

If any member of the W.I.A. anticipates being in Auckland during this period they can make further enquiries from the Conference Secretary (Mark H. Churton, ZL1TB) as soon as possible at P.O. Box 9152, Auckland, N.Z. The registration fee is £N.Z.2/10/0 for the week-end's activities.

VK3 RECEIVER FUND

The Victorian Division of the Wireless Institute of Australia wish to thank the following donors who helped to contribute towards the purchase of the receiver for use by VK3WJ—

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R. Tandy, VK3KJ; T. Tubbrow, WIA-1314; E. Trallock, WIA-1308; the late W. Tregent, VK3JTX; J. Tutton, VK3ZC.

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FOR BEGINNERS:

HEARING THE GOOD ONES

ALAN SHAWSMITH,* VK4SS

WITH present patchy conditions on all frequencies, it is necessary to have all-band operation so that one can be listening on the best band at the right time. During the next two or three years, 80, 40 and 20 metres will be the best DX bands. Few if any can erect beams on 7 or 3.5 Mc., so it means we have to extract the most from single or phased wires.

THE ANTENNA

To do this, we must firstly take a look at our allotment and consider its aspects. It is generally believed that the more wire out in space, results in greater r.f. pick-up efficiency. (This definitely proved to be the case in my particular location. Increasing the antenna length from 136 feet to 264 feet brought the weak signals, both on 3.5 and 7 Mc., right out of the hash.)

There is only one way to erect 264 feet in the average allotment, that is to have some of the long wire vertical and some horizontal. This is an advantage; if the antenna is to be used for transmitting as well, then the vertical section provides optimum angle of radiation.

The immediate question to ask about this, does not such a length pick up QRN, etc. (Here again I can only answer for my particular location.) The answer is, no, when the wire is centred and resonated by an antenna tuning unit. This latter is a must, if one is to extract the most from a long wire. However, there is no place for dogma here, as each must find the antenna that best suits his needs and location. Generally speaking, then, it is best to get as much wire up, in clear space, as your allotment allows. In this way, too, directional effects are minimised.

One comparison can be made, for instance. For transmitting, a 7 Mc. ground plane antenna would be just as good as 260 feet long wire, well up, but this latter will hear the weak ones when there is only QRN on the g.p.

FIRST R.F. STAGE

So much for the antenna. The next important link in hearing the weak ones is the first r.f. stage of the receiver. It is here that the proportion of noise to signal is established. Each type of r.f. tube must be treated individually on its merits to see that it is doing its best. Many run this stage with 300/120v. plate and screen, and bias a little low, in order to get out the most.

PROPAGATION

Before we go on to the optimum listening times, it is well to get the propagation picture clear for the various bands. Old Man Sol is sleepy at the moment. Sunspot activity is low, so a rough forecast for the bands during 1963 would be like this:

28 Mc.: A wash-out, generally speaking. During the pre-winter months

● Last year the author (Sub-Editor of the DX page) received more than one letter complaining that very little of the choicest DX could be heard. Why is it that some can pick up the best prefixes each month while others cannot? The latter usually blame their location, antenna or receiver, but this in fact is really only about half the reason, as many with only mediocre sky-hooks and receivers make out fairly well.

there may be openings to the tropic areas, mostly Pacific, brought about by E layer influence. However, during the winter, this, and to a lesser degree 21 Mc., will be devoid of DX signals.

21 Mc.: This band has prospects during the daylight hours. Pre-winter, there should be openings to the north and east, any time after dawn, but little after dark.

14 Mc.: This band has always been the DX man's "cup of tea". It is a 24 hour band, often, and long haul DX can be had at various hours. However, during winter the band becomes almost dormant at night and reverses itself during mid-summer, when it is best around midnight and worst at midday.

1.5, 3.5 and 7 Mc.: These are night bands. Once the sun is up, the DX disappears, both summer and winter. While the smooth sunspot number is to improve, as far as DX is concerned. So for the next few years, if 14 Mc. falls off in activity, 7 Mc. might prove to be the best band for DX.

OPTIMUM LISTENING TIMES

Half the best DX is missed by listening at the wrong times. Conditions cause band openings to vary, so no definite time pattern can be given, but the following may help.

21 Mc.: The pre-winter sequence of signals on this band in the past has been something like this. From dawn onwards the band intermittently opens to the East and Central America areas are prominent. Sometimes also the N/S circuit is operable and J and UA are loud and clear.

Shortly after midday this band has a habit of opening briefly to South Africa and South America, say around 0300-0430z.

During the afternoon Ws are often audible and when conditions are suitable (M.U.F. OK) around dusk signals from anywhere can appear. Europeans sneak through around 0800z.

14 Mc.: In the past this band has been so good at various times during the day and night, there are signals from all continents coming in at the one time. However, dawn usually brings an opening to the North West with Europe at good strength and sometimes L.P. to North, Central and South

America. Signals from this last named often travel 18,000 miles up and over via Europe and in darkness most of the way. This is from 1930 to 2200z.

Barring the winter months, 20 mx is usually poor during late morning and early afternoon. But often around 0330z and a little later (just as 21 Mc. does) the band opens to Central and South America. These signals are followed by a L.P. opening to Europe (via the South Pole). This circuit is much affected by solar storms, but nevertheless is fairly consistent when taken over a time period of one year (from 0430z to after dark E.A.S.T.).

The N/S circuit on 14 Mc. is often open day and night, but is usually much better during sunless hours. The N/S path lets signals through from J, and UA, but as the night progresses the path swings further to the West until Europe is audible on the short path. The band usually then reaches its peak some time after midnight (around 1800z), when various good prefixes can be heard from all continents except South America. (This latter is often good around 1030z.) The band suffers from a pre-dawn lull around 1800z when it is almost dead or the signals on it are hard to work.

3.5 and 7 Mc. are bands with very similar patterns to each other. 40 mx is the first to open to the East when we crowd in from 0730z approximately. 80 mx opens in the same direction a little later (0830z). After this, the N/S circuit opens up and J, UA, etc. show up, and are heard on and off through most of the night on 7 Mc. mainly. From 1600z, on both bands, the Europeans begin to show up, although they are hard to work on 80 mx. They are easier on both bands around 1930z. Sometimes the 7 Mc. band opens to Africa from 1700z on to dawn and also a L.P. circuit to North America appears around 2000z quite frequently.

For those who want some "snatch" times to hear DX, I suggest they "case" the bands just after dawn or just before dark. 80 mx through to 15 mx are prone to suddenly becoming good at these hours. Also, the time of 1030z (give or take an hour) is excellent. Signals appear from the Americas from VO2 in the north to VP8 in the south. That is almost from Pole to Pole.

All times given are GMT.

APPROACH TO LISTENING

An attitude of impatience or haste is a sure way to miss DX—and unless one tunes very slowly, it is easy to pass over a weak signal that momentarily had dropped into the hash. It is better to listen for a while on a segment of the band rather than swing the dial over the lot. On 7 Mc. particularly, many good c.w. prefixes hug the first few kilocycles of the band.

DX is not the S9 business it used to be. Conditions are such that the average signal is much weaker and has to be dug out, so tune slowly. ●

* 33 Whynd Street, West End, Brisbane, Qld.

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Page 2

Greetings fellow short wave listeners. With the advent of the winter months approaching us the daylight conditions should improve, at least we hope so. With this in mind, how is the time to get that rx or antenna in working order. We complain of poor conditions at times, but how often have you tuned across the band and found perhaps one very strong DX signal on almost a dead band. Which goes to show that the band is at least active in some part of the world. Now often when you listened during a Contest and heard the band full of signals? 38 Mc for instance may not be as dead as most people think. On one occasion your scribble tuned across the 28 Mc. band and heard a South American station at 59 calling CQ, but nothing else was to be heard on the band. I know we are going through a poor period in regard to propagation conditions, but just because you can't hear much, don't always blame the ionosphere.

NEW SOUTH WALES

Don L2022 recently paid a flying visit to Melbourne. At present he is doing a spot of shift work on the local telephone exchange in Albany. Hope you get that QSL from Danny before long Don.

Chas. L2511 has again been hard at it. Just recently he received for the second time in two years, the Elizabethan Award for 80 Mc. Nice work, Chas. In the Ross Hull Contest, Chas. managed very good scores. However a young friend of his has reported a bigger score that may make out the section. Chas. has at last repaired the dial cord. In Edworthy's 440 and it is the moment is busy shielding his 50 Mc. converter.

Chas. reports that at least the ZL boys have now made available a new award to S.W.I. This award is for confirmation of all ZL call areas on 80 Mc. Actually this award is the result of much work by Chas. The award is available at the time of going to press made available to Chas., but other claimants will have to wait until the award has been officially accepted. Chas. is only a few months away from going to Chas. on being number one claimant, and fine work on your behalf.

Now that the ZL boys have made this award available to S.W.I. we would very much like the W.I.A. to make the VK award available to S.W.I. There are no doubt some VK S.W.I. who have heard all States on 80 Mc. (Any claimants?—Ed.)

Recently Chas. received his certificate for the 1953 R.D. Contest. Nice going old son.

VICTORIA

You will all be interested to learn that the VK13 Council have made available the VK13 award which was formerly used for VK1W1. We would like to thank Council for making it available to the Group. There still remains some work to be done on the VK13 award. We are working on the construction group, under the guidance of Ian Woodman. When the rx is repaired we intend to use it mainly for giving the new award an introduction to Amateur Radio. We will also give some of our younger members some ideas on how to prepare a report for the VK13 award.

The construction nights are still proving popular under the expert guidance of Ian Woodman. So any new members are interested in the construction side of things, how about coming along to our evenings which are held on the second Friday of each month at 478 Victoria Parade, East Melbourne.

Attention all short wave listeners! The 1953 Short Wave Contest will be held on the 2nd, 3rd, 4th, 5th, 6th and 7th April. The date is the weekend of 6th and 7th April. The venue is Ballarat. On the Sunday we will be going through the local v.h.f. study also over the weekend-end we will be visiting a v.h.f. Ham shack as well as a h.f. shack. All in all, a great weekend. See you at Ballarat. We will have a chance to meet your fellow S.W.I. that you have heard about. An open invitation is extended to all S.W.I. and to any of the same who might like to see you at Ballarat.

Newcomer to the S.W.I. ranks is Greg. Earl. Greg. has not been issued with an L number yet, but he has been working on his own rx and is very pleased with the results that he has obtained with it. His DX log is very good for a newcomer. Greg is using crossed dipoles with a switching system, and is very

pleased with the results he has obtained with it so far. When you have become more used to the HEBB, Greg., we hope that you will soon have your name in the DX ladder with us. Hope you can get along to some of our meetings Greg., and make yourself known to the boys.

Cliff L2081, who is our publicity officer, has been doing an excellent job giving S.W.I. notes over VK3W1 each week. But it is up to us all to provide him with some information of our activities, we hear this in mind and drop Craig a line. His address is 10 Foch St., Ormond, phone number is LW 1773. Any news that you can forward will be very much appreciated.

Several years ago, we here in VK1 used to run monthly club meetings and due to lack of support we were forced to abandon them. We would like very much to re-introduce some activity along these lines. However it would be completely waste of time if there were again unless more interest is shown by members. So let us have your ideas on the subject. Remember the S.W.I. Group can only function successfully by each and everyone of us showing a keen interest toward the Group. If you have any proposals, don't just be content to sit back and have nothing to say. We want to hear from you, the member, so don't be frightened to get up and have your say.

At present we have a monitoring watch on the 7 Mc. band. And if this proves popular it will be most encouraging.

QUEENSLAND

We are pleased to hear that our good friend Afton is at last on the improve after sickness and business troubles. Afton reports that conditions up in Northern VK1 have been very poor since the end of the year. Afton has received for many months have taken his total up to 85 confirmed. He is becoming P. Field's 134. He has also received a number of awards including an I.R.C. and a S.A.K. he is getting very few returns. Yes we all are in the same boat and we should be glad to hear you would like to change it for a run in the Boia Royce class, one of these days. Best of luck to you old son, and hope that your dreams come

true. Thanks for the good wishes which are heartily reciprocated from this QTH. Very pleased indeed to hear from you again Afton and give my regards to all the boys.

SOUTH AUSTRALIA

Darrell L2041 has just joined our DX ladder. Very pleased to have you with us Darrell. During the Xmas holidays Darrell was in VK3 and reports hearing all VK call districts except VK3 on 7 Mc. using his transistor portable and a three-foot whip. He also managed to find time to get a few points in the N.Y.D. Contest recently, and it is very nice to see some new names on the DX ladder. How about some of you other VK3 boys sending in some news of your activities?

WESTERN AUSTRALIA

Peter L2021 comes forth with another very interesting letter telling of his activities. Peter is using a Pye 6-tube rx as his hearing aid. Also Peter has received a number of awards on 7 Mc. He is using a folded dipole, and on 16 Mc. uses one leg of the dipole. Judging from your reports Peter you are hearing plenty of activity on 7 Mc. So far June 24th Peter has 13 cards for the month. Thanks for your very nice letter and look forward to hearing from you again next month.

Afton L210/VK4 has these: VP4, KP4 and ZET.

72, Mac Hilliard.

DX LADDER

Countries	Zns.	S.A.B.	W
Conf.	Conf.	Conf.	Conf.
E. Trebilcock	877	285	40
D. Granley	113	237	18
A. Woodcock	9	219	31
M. Hilliard	7	197	25
M. Cox	64	223	38
P. Field	134	194	14
C. Abernethy	47	96	38
N. Harrison	44	94	37
P. Field	134	194	14
P. Field	134	194	14
D. Coggin	9	186	8
M. Burger	1	185	8

YOUTH RADIO CLUBS

Good news from VK1 this month! Ian ZZZ, Secretary of the VK1 Division, reports definite progress in Youth Radio Clubs in that State which has been appointed co-ordinator for that Division and is busy seeking co-operation and help in all directions, especially headmasters and teachers. Anybody who wants to keep their frequencies clear for the boys.

Reg Z2AO is a teacher at New Norfolk High and has begun the formation of a club there. Merv YCL is a teacher at Hobart Tech. High and is giving the idea some thought—some definite help from other locals would bring it about. The headmaster of Hutchings Grammar School has approved the formation of a club, and ex-TSCM teachers at the Friends' School (Hobart) is investigating the possibility there. The 15th Hobart Scout Group is well on the way to having a club. Father Burns, of Burnie Marist College, has a club under way. This college caters for boarders and such a club is sure to be of considerable addition to the spare-time activities of the boys. Father Burns is contemplating the A.O.C.P. but would certainly appreciate some help from Burnie Amateur.

Congratulations to all in VK1 who are directly helping. I hope all other VK1s will do the right thing and pull out those boxes of parts which have been sitting around for years. I can assure you that it is most important to make the early stages easy. Once the boys feel the magic and the fun and are not going to cost a fortune, the rest is easier.

A number of lads from St. Leo's College, Wahroonga, attended the Gosford Radio Club's Field Day on Feb. 17. Amosford Club was warmly welcomed and enjoyed the day very much and expects. Also at the Field Day was Ian Forrest (VK4JAP) the first A.O.C.P. from the Youth Radio Clubs in Australia. He is doing excellent work at Bourguin High. Keith

reports that seven ex-members of his club have moved into electrical and electronics vocations.

At VK1L5 (Lyncham High) my own activity has been severely curtailed in the last year for health reasons, but the club stewards George IGB, Roger Davis hoping to get the club back on its feet. In the last year, Ian Reine, Bill Tweedie, and Carl Brinkley (son of Tony 1951) do more than I do—a very healthy state of affairs. Roger is now been working hard to plate modulate an AT3 and make it behave itself. George is now in his final year of High School and has recently cut down Amateur Radio to concentrate on his school. His goal is a maximum pass and Commonwealth Scholarship leading to B.Sc. As an incentive to the new four months, Ian Reine of the latest Collins gear—these are pinned up over his study desk! During the holidays, George constructed a s.b. spanning set. By the time you read this, it should be on the air—but at VK1L5! He is donating it to the club station until Nov so that he won't be tempted to have his own. What will-power! Anyway, we hope we're the first Youth Radio Station with a.s.b. entirely constructed by one of the boys.

News is hard to get from VK4 3, 4, 5 and 6. Could it be there is none? Surely they can find a co-ordinator—despite the fact that this is the isolated outback! Two very prominent VK4s told me in January that all the Y.R.C. information was nearly "dug-out-holed" and had been in the Division for years, although a few brave souls had formed clubs.

And here's a challenge for VK4PanSy—instead of talking of "band-wagons" and quoting the isolated outback, when we salute for bravery, why not find a Y.R.C. co-ordinator for the Division. We haven't heard of one yet.

Provocative 73, de Ken VK1KEM.

H.F.

VICTORIA

50 Mc.: Ken 3ZLL is now active on this band. He is running 12 watts to a 6166 on approx. 14.5 Mc. Sid 3ZDB (1Q423) as a modulator. Sid 3ZDB at Croydon will be re-appearing on the band, but this time will be using s.b. Glen 3ZRL is active again on 14.5 Mc. leaving 3ZK4. When he returns to the Sunshine State he will be located near the VKS border and possibly will operate from that area a number of times until the first week in December.

Activity, which was very low on 5 mc at the beginning of Feb., is steadily increasing. The Feb. 5 mc scramble was held on Sunday 24th. Unfortunately the control station did not put in an appearance, but the contest finally started with David 3QV acting as control. Only 12 stations competed, including two from the Geelong area, 3QV, 3ASG, 3ZAA and 3ZGM tied for first place in the city section with 8 points each, while 3ZMH won the country section with 9 points. The April scramble will be held on Sunday 28th commencing at 745 p.m. Join in.

144 Mc.: Bill 3ZLO has a new rig operating using a QQH/40 in the final. At first Bill had modulation troubles, but these have now been overcome. Rex 3VL, who normally provides a DX signal from Murrumbidgee, has been holidaying in Melbourne and rag chewing most nights with the local gang. Bob 3ZRD has been QRMing recently, but with a new antenna and has replaced his "big wheel" antenna with an 8 element yagi.

The March 3 mc scramble was held on Sunday 10th and over 20 stations participated. Rod 3ZIW drew in the city section with George 3ZIQ, both with 36 points, while Bill 3ZLO was second with 33 points. The country section was won 3ZMH with 33 points, followed by Graham 3ZIX/P with 19 points.

Peter 3ZPC received a letter from Vern 2LSAQ confirming that it was his signals that were active at 83.55 in Melbourne on 17th January, 1963.

The frequency of 144.8 Mc. was chosen some time ago as a test for v.l.s. operation and net frequency, but very few Amateurs seem to be using it. A small net sometimes gathers on a Monday evening at 8 p.m. but that is about all that there are. Numerous advantages for all stations active on 5 mc to be able to transmit on the one frequency. Originally the idea was to leave your people on 144.8 Mc. while you were working around the shack so that when someone called CQ they would go to on the net frequency and you would hear him without having to continually tune the band. Once contact was established the stations could then change frequency if they so desired. However, there is no reason why the contact should not stay on 144.8 Mc. with other stations joining in to form a net. Naturally by being able to transmit on the net frequency you could break in at any time. Those of you who do not possess a v.l.s. should try and get a crystal on the net frequency.

The annual general elections will have taken place by the time you read these notes and a new publicity officer will have been chosen. Thanks to those who have been working and provided me with news during my brief fill-in period in the job I hope to goodness that the new officer will be more more satisfied. Remember, the notes can only be as good as you care to make them. 73, 3ARZ.

SOUTH AUSTRALIA

50 Mc.: The 5 mc band has been showing the slight decrease in activity that we expect just after the sporadic S peak. DX was working on 5 mc from the 15th to the 19th and 21th (VKEs on all three occasions).

Mobile has shown an increase recently, with 3ZDZ and 3LA having mobiles going (and both are now happy) and capable of working cross-band duplex mobile, very interesting exercise. Other new mobiles include Bar 3ZGZ and Carl 3CL formerly 3ZBL. Mobiles are being used more and more by the conductor. These chaps will use 3ZSAs and 3LS respectively.

New chaps on 5 mc include Mark 3ZEX, 504 Mc. and Bob 3RF (a pair of 834s, wow!), Bob is at Murray Bridge (about 50 miles East of Adelaide) and puts a good signal into the city. Wally 3ZEH (50.13) is another newcomer.

Old timers on 5 mc from new locations are manifold, and include Doug 3SKK (also on the 14.5 mhz band), 3ZKX (1Q423) in Darwin. Also Brian 3ZRH, now at Clare (130 miles North), Brian looks on 5 mc every evening at 1830 (C.S.T.) with the beam towards Adelaide. Clare is only 50 miles away, but the path is very difficult. Joe 3ZCP, now at Whyalla, has been working back into Adelaide nearly 140 miles.

The 50 Mc. beacon has been running almost continuously over the past six weeks and ground wave reports are coming in from Mt. Gambier (320 miles), Western Victoria (180 miles), Crystal Brook (130 miles) and Yorke Peninsula (50 miles).

144 Mc.: Quite a high level of activity here. Several new country stations have helped the activity including 3ZGZ and 3ZM7 of Port Pirie (and both members of the newly formed Port Pirie Amateur Radio Club) and Geoff 3ZCC of Broken Hill. As these chaps have worked into Adelaide with excellent signals.

Rick 3ZB is a new local on 144 Mc. He is located at Glen Osmond and uses an 832A.

The chaps down at Mt. Gambier inform me that "Lancelotti" (TWN) is offered copied (three nights in one week recently). This snacks of ducting and the chaps are keen try 288 and possibly 144 Mc. to the Apple Isle, but no sheds have been organised at the date of writing. These same Mt. Gambier fellows say that our new beacon is heard here about a high percentage of the time (320 miles).

Eric 3ZDQ is building gear for 3 mc. Two metre starwarks, 8NW (Crystal Brook) and 3ZCY (Renmark), have been working on their 5 mc facilities recently to permit many long distance (130 miles) duplex contacts between 6 and 3 mc.

General News: Biggest news here is the annual general meeting of the V.H.F. Group held on 4th March. New officers elected are: President, Doug 3SKK; Vice-President, Gary 3SKK; Secretary, Doug 3ZKX; Treasurer, 3ZCR and Brian 3ZBR. Discussed at the meeting were, firstly, a hidden tx hunt (first in VKS) to be held on 17th April, and secondly a V.H.F. picnic on 18th March.

Recent visitors to our fair State were Ken 3ZKK and Peter 3ZGM. These chaps had mobile gear on 5 and were worked at speed. Gary 3ZCR was the first meeting for 144.8 Mc. chaps who have been holidaying in Adelaide. Dale is well and truly involved in women trouble, but Gary is more or less active, and, in fact, attended the V.H.F. Group meeting on 4th March.

Our newly elected President, Doug 3SKK, returns to VKS in April. For their services over the past year the Group's President Gary 3ZK and ex-Secretary Gary 3BQ 73, Al 3ZCR.

WESTERN AUSTRALIA

Because of personal commitments, the notes for last month had to be shelved. I will attempt to cover them this month.

The January meeting was well attended and as reported it was the first meeting for two months to discuss and act on items of business. John 8JO gave the lecture on xtal filters, we heard up to 16 lbs. together giving none of us an insight into their operation and uses. A report was received on the very interesting fox hunt conducted by 61RY, using a different search method to determine the winner.

To start you took a mileage reading and filled in a form which was completed and handed in after you found the tx. You counted the number of miles you travelled over the converter/receiver and amop loop and subtracted these from 100. You subtracted 1 point for any mile or part of a mile over 100. You then counted the route. You added 1 point for the number of people who saw the tx and the number of other people who saw the signal. At the latter, there was a tx and three antennae which could be switched and had quite a few of the hands going in circles as the signal appeared to come from different directions just as you seemed to have it pin-pointed.

The February meeting was well attended, although the D.C.A. trainees, who are part of the backbone of the Group, are still in

the field training. Two new members were welcomed to the Group, Jim 8RI and Harry 8ZL. Both are well known to members. The Feb. fox hunt was run by Bob 8BE and as usual was quite interesting. Lance and Gill won the event and will run the next hunt on 16th March.

The Group station 6VF operated in the National Field Day on 80, 40, 30, 15, 10, 6, 3 and 4 metres. It is a pity that there was no 1 mc gear available as it would have been a clean sweep from 3.5 to 576 Mc. Kevin 6ZCB again supplied his caravan and gear. Jim 6RU, Jack 6BU, Rod 6ZDS and Charles 6LK supported other gear David 6DZ, Ken 6ZBT and the others of the Field Day Committee did a good job and all in all a good time was experienced by those who participated.

50 Mc. has been very quiet here for the last two months. Quite a few of the stalwarts are D.C.A. trainees and have been to country centres for in-the-field training. The 57.1A news was relayed on 5 mc for the first time in years and favorable comments were received after the broadcast. Vic 6VK has taken over from Wally 6WG as broadcast officer, following Wally retiring from this position, and he has arranged for Bob 6BE to relay the news on 5 mc. Bob is now in Vic and he can be sure of the backing of the Group in his new post.

144 Mc.: Except for cross band work, this band is almost dead here, very few contacts have been heard for some time.

874 Mc.: Rod 6ZDS and Charles 6LK have succeeded in working a distance of 37 miles from North Daldeup to South Perth. Both rigs were xtal locked and are reported to be extremely reliable. This would be very close to a new 376 Mc. record and I believe it will be claimed as one. 73, Allyn 6ZDM.

N.Z.

50 Mc.: VKs are annual working on 2nd, 4th and 10th Feb. Also heard on these days were VKs 1, 3 and 4. Weak 3ZL was heard on the 4th and the 2nd. A 2 mc station carrier was also audible during all three openings. No other DX openings were observed during the month. With the decrease in the 2 mc season, fewer Channel 3 openings were observed, however ABQ3 was received on 10 occasions, ABSS and ABNS each on one occasion.

9AS has been working to leave and is active again from New Guinea. 8ZBY has now gone south on leave and will be having several 9QOs with many Brisbane operators during the next month or so.

No activity on other bands during the month. 73, Roy 9AU.



DX NOTES

(Continued from Page 53)

The next few years, the following award might interest VKs: Sprinkles to 144ZGZ and 144.8 Mc. is 90 x 80 Award. It comes in three classes: (i) 80 different countries on 144.8 Mc. (ii) 80 different prefixes. (iii) 50 QSLs from stations outside one's own continent. Apply to Sven Elfving SL3ZO, Solgardsgatan 15, Ornskoldsvik, Sweden. Those needing Russian Call Books can write Sven at the above address.

APPRECIATION

Let me thank again all those who have taken the time to write within their spare time the trouble to send in what information they have. Those who appear in the activity section usually help out considerably with the QTH situation. Thanks.

My appreciation also to the overseas editors K6QCV, W4STGY, G6RVN, SL3ZO, OHFV, WIDEQ, ON4MC and others who remember this column each month. 73, Al, VK4SS.

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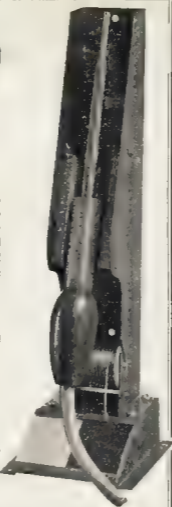
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rooms does not lend itself to such games on with Mam equipment. All is not lost, however, as 80 mx mobile is in course of construction and will soon burst gloriously forth if the jalousie is precise enough to pull it.

Where are our long lost sons, Gordon 3GW and Keith 3QG, who so nobly offered to work us from the State capital where they now reside? Let us not lose heart, though for Max 3AR is nearly ready for the hook-up with his first home-brew gear and Mac 3AZM has moved into Hornham and looks like being a regular on the weekly net.

We have missed Herb 3NN for a long time now but as son Gary has obtained a Limited licence there should be at least one, if not two signals from Yanae shortly.

Bert 3EF still radiates steadily on at Warracknabeel, sometimes 80, sometimes 40, sometimes DX, but always with a signal to be proud of—or should it read "of when to be proud." Well, fellows, you asked for it—putting this month's compilation in dubious hands. Cheers, Vic 3ARQ.

EASTERN ZONE

The Eastern Zone will hold their annual Convention during the week-end April 20 and 21, 1963, at Warragul. Full details will be on the invitation cards which you will receive shortly. Welcome to any visitors.

A Zone meeting took place on Sunday afternoon, Feb. 17, in Bert's 3DB back garden. The main items discussed were the upcoming Convention, initial arrangements for the Zone W.I.C.E.N. Gippsland Control Centre and Network.

Also keeping activity high in the Zone land in view of the coming W.I.C.E.N. network! It has been decided to hold the Eastern Zone hook-up now at 800 hours on Sunday, even on 3650 kc. approx. and 144.18 Mc. What about joining in everyone? This should be a much more convenient time for everybody. See you all at the Convention. 73, 3ZCG.

QUEENSLAND

February always leaves me with a feeling that I've been "got st". The end of the month sneaks up and March is well started, by the time I wake up that I'm a few days short. My spies in Brisbane apparently suffer from the same trouble or else they are all living very pure lives. Well, nearly so!

The "Kingfisher" group which meet regularly at 0900 each day on 40 mx, decided to get together on a "Hamboree". That will stop Sir Webster because he doesn't even get "Jamboree" in his famous book. Anyway Sunday, 24th Feb., was the date selected for the first "Kingfisher Hamboree". It was held at Caves Creek in the glorious setting of the Nunimrah Valley.

After their usual morning "sked", the group headed for the Hamboree. All 40Ls, being a good scout, is always prepared and used his mobile to good effect, telling various VKEs about the proposed outing. When he arrived at the spot selected, he found Jeff 4XP, George 4GG and Tom 4PD heading out of the area in search of firewood, and being QSO with 2CH. At the time, the mike was passed between one so as to enable said wood gatherers to say hullo to 3CH. What some blokes will stoop to do, to get out of chopping wood. When I was younger and used to go on picnics, always... Never mind, you wouldn't believe me anyway.

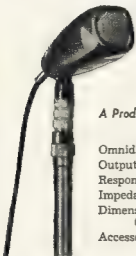
During the afternoon, the "Hamboree Cake" was unveiled and George 4GG, armed with an axe, cut it. And what's more, got his photo "look" whilst doing it. I'm sure Mavis, his YF, smartly put him in the doghouse for that. Mavis, by the way, made the cake and I'm told it was very beautifully iced. I'll bet George was too, after his effort with the axe. I have no sympathy for you George. To play a trick like that on your YF. Shame on you. And to think that he gets a cuppa, every morning, his slippers brought to him, his licence paid, his log book kept up to date. How can you do it? Words fail me. Thanks Mavis, I would like a piece of that cake.

Jeff 4XP, Howard 4WO, Les 4EH and family, together with Bill 4ZBD and YF also attended the Hamboree. The only Kingfisher absent was Bill 4WV who was ill. A total of 39 attended the outing and general opinion was that it was a huge success and that it will probably end up as an annual event.

The Central Qld. Branch had their monthly meeting on 15th Feb. and was very well attended. Their Patron, the Mayor Alderman R. Philbeam, was also in attendance. Main business of the evening was election of officers for 1963. Frank 4FN was re-elected as President, Secretary is C. Bennett, Secretary W. Peterson and Publicity Officer is 4ZCK. Frank 4FN sounded a warning to those not using



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month I paid my Radio Amateur licence at the Newwood Post Office instead of tracking all way up to the Receiver of Public Monies at the G.P.O. This will bring joy to Max 2ARZ, to several buds in VK4, and to several of the VK3 fraternity who have never let the matter die since my original paragraph two or three years ago. Oh dear, oh dear, however will I fill these notes now? Don't answer that, please.

One of the members rushed up to me at the meeting and said in a very threatening manner "You are going to get a good one, you shot at you," and grinned in fiendish anticipation. I puzzled just who was licensed in Eyre, but no dice. Then it struck me, there was an Ayr in North Queensland. Oh me, oh my, can it be that a VK4 is again to attempt crossing swords with me? My diabolical life is brightened at the thought. "To the battlements men!" "Methinks the air is rotten in Ayr." Pardon me, danger brings out the worst in me!

Well, here we are again, annual leave time. The notes next month will be written by that ace journalist, Brian SCA, I hope, and for once your sense of propriety will not be offended, nor will you have to read my mutilation of the English language. There is no truth in the rumour that I am fleeing the State because in my description of the "Xmas Doc" I was foolish enough to say of the three charming young ladies in the kitchen—"May their shadows be long and their less." Woe is met! 73 de SPS—Pansy to you.

.....

WESTERN AUSTRALIA

Pow! Pow! Two shots rang out and Paladin lay writhing in the blood-soaked dirt, heels kicking spasmodically, while Ross Bonanza stared at him through slitted mechanical eyes, over the top of the smoking, hammerless revolver—oh! What's the time? What band are we working? What can't it be March? It's April! Heck! Next it'll be May! Time, that the end of the financial year! Here it is half the year gone and nothing done. So get with it, chaps!

Talking about doing something, had a personal contact with Pat 6PH recently, and discussion got round to the psycho tests given to all members of the Armed Services. The old one was mentioned and Pat said they really did see a ship in the middle of the jungle up in the islands. I had apparently sailed and returned from the same place last season and got stuck and there the corvette was, viewed with some surprise by Pat and the mob. Well! What would you say? Yes, I'll bet there wasn't any radio gear left on it by the time Pat had passed by.

Mention of Radio gear reminds me, our Technical Officer, Ralph 5EAD, is working on the Divisional BC343 Rx so that it will be in up-to-top shape for use by our new Broadcast Officer, Vic 6VYK. Good work, Ralph, don't spare the expense, but the tx another valve. Congrats, too, to Vic as Broadcast Officer. Vic says the W.A. news will be broadcast:

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simultaneously on 80 (a.s.b.) and 40 (a.m.) and re-broadcast on 6 m by Bob 8RE. In handing out the bouquet, I was joined by 64G and 64J who carried the news broadcast for so many years. This wasn't the only job Wal was doing, as he was also getting ready for the rotary. Cheers Wal, and thanks from us all for a fine job.

A fine job calls to mind that the V.H.F. boys have been at it again. Providing a service for car trials seems to be a regular thing nowadays, and I would suggest, an excellent thing. I've got a modern 250 cc operating mobile. Enthusiasm evident in large lumps everywhere. That reminds me, what happened to that vibrator power supply I loaned someone for the first car test. Mine's still there.

Alyn 5ZDM tells me he wants someone to develop a new device. This is called a "cleit" suppressor. Specifications is that it should be entirely automatic once the rx is tuned in, be able to discriminate between clots and non-clots, have a bandwidth of 15 cycles to 15 kc. a.m. fm, and a.s.b. with the ability to turn the far end tx off after a reasonable time as a desirable characteristic.

Our President (Ron 8KW) having recovered from his cold, is back to normal, eyes normal shape and has stopped drinking sick, turned the tx here recently to request a change in the name of the club. Ron says he's having feeder trouble, too. Must be all the hyphens getting stuck Ron, and making the wind brittle. Oddly enough, Allen 6WQ didn't even lose the VGL. Perhaps it's that quad's not quite cubical or something. Allen.

Have a couple of sickies on the list at the moment. Associate Ross Hardwicke not enjoying the best of health at the time of writing, so we trust that all is OK again by the time you read this. And Assoc. Maceo didn't make the February meeting either, because he had an argument with a car, whilst he was on his way to the meeting. Fortunately, Geo. was able to go home after observation at the hospital. Hope there are no after effects. Geo. and you are about for the next meeting.

Bellie 6VYK (Gee) 6GJ had a trip into the Great Southern recently, went through Bunbury at a rate of knots so did not see Les 6WL or Cole 6CL (incidentally, if you see a mole, please let me know). Bellie was welcomed and raced on to Kalbarning to join the X Group in the congenial surroundings of the Kalbarning Club. Geo. certainly appears to be enjoying his retirement. A fine figure of a man. A gentleman and a scholar, sir. Besides, he knows a thing or two, and he's got a good head on his shoulders. Technical articles we get after the news broadcasts on Sundays. Keep it up, Geo., they're popular.

The only real news I have from the country this month is word of 6LF racing down from Camarvan to Geraldton recently to be in the local news. Gee! Did you follow the signal all the way!

As regards the State generally, Tony 6TVY, who labours for the D.C.A., says there are two of every conceivable piece of radio gear in various parts of the country in preparation for the Royal visit, so we hope everything works OK.

Well, there it is chaps, if you are shy about seeing your own name in print, put some of our coppers in and I'll mention them. Cheers for all.

.....

TASMANIA

Our Divisional Council elections will be over by the time these notes are published, but I wish to publicly acknowledge our debt to two retiring Councillors, namely, Ken TEA and Allan TMY, both of whom were re-elected. Ken TEA has been our Divisional Secretary for six years, during which time he has laboured long and hard. I am not aware of Ken having missed a Council meeting, and I am only aware of one Divisional general meeting missed by Ken in all that time. At one time, Ken was Divisional Secretary, Bulletin editor, publisher and distributor, and Sunday morning broadcast officer, all of which amounted to the duties of many for one man. Mercifully, our next Secretary will not have to cope with all these duties. In addition to his duties, Ken has been an active supporter of the various Divisional activities, including participation in the Remembrance Day Contests annually, the National Field Day, and other functions such as those sponsored by the Club Room Fund-Raising Committee. Ken, we understand your desire to relinquish the ties of the many duties and we thank you sincerely for your many good works.

Allan TMY has been a Councillor for two years on this occasion. Allan was responsible

for providing the technical article in our monthly Bulletin, and he has always taken a lively interest in Council and meeting activities, as well as being on more Amateur bands than any other Amateur in VK1. Allan has covered a considerable amount of the 6 and 2 m bands. He has done all this while building a new home and carrying on his livelihood as a farmer. We thank you also Allan for your many contributions.

David TZAY celebrated his 21st birthday on 6th March while Danny on both 3.5 and 2 m, during the A.R.R.L. C.W. Contest in Feb. were really excellent and many stations were worked by the few VK1 stations to take part. Conditions in the B.E.R.U. Contest, however, were not very encouraging, even though Pacific area stations at times were worked.

Our March lecture was on Tunnel Diodes, and what a truly excellent address this turned out to be. Not only was the theoretical side of the subject explained, but a fine demonstration of gear was most impressive. Anne Landers has recently taken delivery of a new Plessey 6000, and has it in proper functioning order very shortly. Members, remember that subscriptions are now due. Please forward your dues to Box 851J, G.P.O., Hobart, not to the Club Secretary. The troubles connected with removing and re-installing your name on the circulation of this magazine.

The Youth Radio Clubs are now receiving concentrated attention from this Division. I have to thank TFA for supplying me with all the necessary information on this topic. We now hope to proceed at speed with this project within this Division. If you can help with this project, let your Council or Zone Secretary know. We will be able to use your services.

We were delighted to meet Bob 4RW down here. Bob and Hobart 7JH have been welcomed into many of our homes here and was also able to attend the meeting of the 64J Group on 15th Feb. We hope to meet up with you there, the 7th March, Bob.

NORTH-WEST ZONE

The meeting in March was a social event with an enjoyable selection of movies by courtesy of Sid TSP. Sid also gave us a working presentation.

The evening was marred somewhat by a communication from the Southern Zone unequivocally advising of our status. It is most distressing that our diplomacy is not employed in such circumstances.

There seems to be little activity on the bands, although Bob 7JH has worked some DX on 20. I noticed Winston has a mobile whip on his car and 7ZHH is mobile on 16.

David TMS seems to have big things in mind and plans to surprise us with a new rig. I wonder if another "duck" is about to take to the air.

Had an interesting talk with visitor Bob 4RW recently. His zone in VK4 apparently has similar troubles, etc. I am sure the picture seems the same all over.

The tx hunt on 17th March is now over, so no doubt the winner has been announced. 73, 7ZHH.

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D.C. Current:

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D.C. Current:

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Resistance:

0 to 60K, 6 megohms.

Capacity:

10 pF. to 0.1 μ F.

Decibels:

—20 to +22 db.

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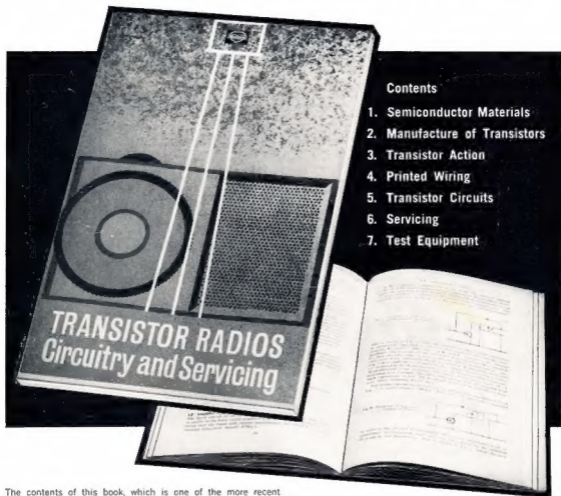


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